RURAL DELIVERY AND THE UNIVERSAL SERVICE OBLIGATION:
A QUANTITATIVE INVESTIGATION

Robert H. Cohen
William W. Ferguson
Spyros S. Xenakis

U.S. Postal Rate Commission

RURAL DELIVERY AND THE UNIVERSAL SERVICE OBLIGATION:
A Quantitative Investigation

Robert H. Cohen
William W. Ferguson
Spyros S. Xenakis

Postal Rate Commission
Office of Technical Analysis and Planning

July 31, 1992

1. Introduction

1.1. Scope and Purpose

It is widely believed that it costs more to provide rural areas with postal service than urban areas. This belief is based primarily on the perception of a cost differential between rural and city delivery.[1] This perception is one of the bases for the argument that a universal service requirement is necessary to assure the continuation of rural delivery or at least the level of service currently accorded rural areas.[2]

The purpose of this paper is to analyze rural delivery costs and compare them with city delivery costs. Using routine cost data submitted in the course of postal rate proceedings, Section 2 of this paper compares the cost of rural and urban delivery, Section 3 shows the relationship of rural delivery cost to population density, Section 4 analyzes the "profitability" (viz., contribution to overhead) of serving rural areas, and Section 5 presents some concluding remarks and a brief summary. Before turning to Section 2, some background information on rural delivery and city delivery is offered.

The views expressed in this paper are those of the authors and do not necessarily represent the opinions of the Postal Rate Commission.

[1] According to the 1991 Comprehensive Statement on Postal Operations (p. 66), USPS delivery costs represent 30 percent of total costs; window service and mail processing, 32 percent; transportation, 7 percent; and administrative, building occupancy, and all other, 31 percent.

[2] This paper focuses on the detailed comparison of delivery costs, between rural and urban areas. It does not purport to show the bearing, if any, this cost analysis might have on questions regarding the complex issue of the postal monopoly, which encompasses many issues beyond the scope of this paper.

1.2. Relation of Rural Routes to Demographically Designated Rural Areas

  The Postal Service has about three times as many city delivery letter routes as rural routes. City delivery routes serve geographic locations within the boundaries of a post office, while rural routes generally serve areas falling outside these boundaries.[3] City and rural carriers are in separate labor unions, and their compensation is determined separately based on different factors.

  The United States Census Bureau (1990 data) reports that slightly under 25 percent of the 250 million people living in the United States live in rural areas.[4] The remainder live in urban locations.[5,6,7]

  In 1991, the United States postal system provided service to 102 million delivery points. City routes served 78.5 million and rural routes (including contract routes) served 23.4 million delivery points.[8,9] A total of 95 million delivery points

---

[3] United States cities and the areas served by their post offices often expand to absorb surrounding areas served by rural routes. It takes a great deal of time to administratively convert a rural route to a city delivery route. Thus, some rural routes will serve areas annexed by cities and their post offices.

[4] Bureau of the Census press release, CB91-334, Dec. 18, 1991.

[5] As defined for the 1980 census, urban areas include: (a) places of 2,500 or more inhabitants incorporated as cities, villages, boroughs (except Alaska and New York) and towns (except in the New England states, New York and Wisconsin), but excludes those persons living in the rural portions of extended cities; (b) census designated places of 2,500 or more inhabitants; and (c) other areas, incorporated or unincorporated, included in urbanized areas. All non-urban areas are rural.

[6] The Census Bureau reports that in 1980 there were 6,619 incorporated places with more than 2,500 inhabitants. In 1991, the United States Postal Service provided city delivery to 6,625 post offices, but not all were in incorporated areas.

[7] The United Nations has estimated that 27.5 percent of the population in the more developed nations would live in rural areas in 1990. See *World Population Trends and Policies, 1987 Monitoring Report*, The United Nations, Department of International Economic and Social Affairs, Population Division, page 176.

[8] Comprehensive Statement on Postal Operations, 1991, p. 49.

[9] Highway contract routes (star routes) are similar to rural routes. The difference is that the carrier is a contractor to the Postal Service, not an employee. Contract routes serve 1.4 million delivery points.

are residences; the remainder are businesses. Thus, rural (and highway contract) routes serve slightly less than 25 percent of total residential delivery points; this is the same as the percentage of the population living in rural areas.

1.3. Description of Rural and City Delivery

All rural routes use vehicles to deliver to a box placed along the roadside, and virtually all provide six-day-a-week delivery. A rural route is defined in terms of the roads it traverses. Homes or businesses not located on one of these roads must place a mail receptacle along the route traveled. For this reason, boxes will frequently be clustered where a rural route intersects roads not on the route. In this sense, rural service is inferior to city delivery where service is provided to (or in close proximity to) each building served.

Most city delivery routes are "park-and-loop" routes. The carrier on these routes uses a vehicle to drive to various points along the route where the carrier dismounts and delivers to a portion of the route on foot. Some city delivery routes, called "curb line routes," use vehicles to provide curbside delivery to a mail receptacle along the curb as is done by rural routes. A third type of city delivery route is the "foot route."

City routes are further categorized as "business," "residential," and "mixed" (business and residential) routes. Business routes (consisting of at least 70 percent business deliveries), which account for less than one percent of all possible city deliveries,[10] are five-day-per-week routes. Mail on all other city routes is delivered six days a week. Very few routes service businesses or residences exclusively. For example, on residential routes (which account for 94 percent of all possible city deliveries), businesses account for five percent of possible deliveries. The percentage of possible deliveries on rural routes that are businesses is not known. Although the activities of city and rural carriers are similar, some minor differences exist:

- rural carriers spend about three percent of their total time providing retail services

---

[10] "Possible delivery" is used to describe a household or business address (including apartments and suites) to which mail might be delivered by city carriers. "Box" is used to describe the receptacles each family or business sets up on a rural route to which mail might be delivered. The two terms stand for similar concepts and for purposes of this paper are used interchangeably.

(e.g., selling postage stamps, rating and receiving parcels, etc.);

- city carriers provide no retail services;

- rural carriers transport mail to and from small post offices along their route; and

- city carriers sweep more collection boxes along their routes than do rural carriers.

2. Comparison of the Cost of City and Rural Delivery

2.1. Comparison of Carrier Time Required to Serve City and Rural Areas

Table 1 shows that the average time per day per possible delivery is 1.04 minutes for city delivery[11] and 1.07 minutes for rural delivery. (This small difference would be further reduced if retail activities of rural carriers were not counted.) The virtual equality of the average carrier time to serve urban and rural customers is a major finding of this paper. Part of the explanation for this finding can be inferred from table 1—*businesses* require considerably more time per possible city delivery than do *residences*.

The average possible delivery on *business routes* requires five times as much carrier time as the average possible delivery on *residential routes*. There are several reasons for this large difference in carrier time:

- Businesses receive almost three times as many pieces per possible delivery as do residences. The statistics shown in table 1 (row 2) reflect both in-office and out-of-office delivery time.[12] In-office time is closely related to volume.

- In business areas, carriers travel by foot, and many deliver in large office buildings to individual suites.

---

[11] This analysis includes only city delivery letter routes. It excludes parcel post and support routes which primarily serve business districts in larger cities.

[12] City and rural carriers typically spend between three and four hours in the office preparing for delivery.

Table 1

Selected Statistics[a] for
City Delivery and Rural Delivery Routes
(1989)

Item	City Residential				City Business[b]	Residential, Business and Mixed				All Rural
	Foot	Curb	Park & Loop	Total	All	Foot	Curb	Park & Loop	Total	
1. Possible Deliveries (millions)	11.5	15.1	46.9	73.4	0.6	12.6	15.7	49.7	78.1	20.5
2. Minutes per Day per Possible Delivery (in-office and out-of-office)	1.00	0.83	1.01	0.97	5.55	1.21	0.85	1.06	1.04	1.07
3. Seconds per Piece (in-office and out-of-office)	13.24	9.54	12.93	12.22	21.44	14.78	9.69	12.98	12.50	14.94
4. Pieces per Day per Possible Delivery	4.53	5.21	4.70	4.78	15.52	4.89	5.28	4.92	5.01	4.30

---

[a] See Appendix A for source.
[b] Reflects the fact that business routes receive service only 5 days per week.

- There are no curb delivery routes in business areas. Curb routes are suitable only for residential areas. Table 1 (row 2) shows that they require less time than either foot or park-and-loop routes.

On the other hand, a direct comparison of rural to city residential delivery reveals that *rural carrier* time per possible delivery is only ten percent greater than *city residential route* delivery time. (Seven percent higher if retail service costs are eliminated from rural.) There are at least three major reasons for rural route time per possible delivery being so close to the corresponding time for city residential routes:

- Rural routes are the functional equivalent of curbline city delivery, the most efficient form of city residential delivery. Curbline routes, however, account for only 21 percent of city residential possible deliveries.

- Rural routes have only 4.3 pieces per possible delivery, while city residential routes have 4.8. Thus they incur less in-office costs.[13]

- As described earlier, rural customers who do not live along the rural route must place a mail receptacle along the rural route. Thus, rural mail boxes tend to cluster where roads (not on the route) intersect with the carrier's route. A rural carrier can serve a cluster of boxes much faster than if the individual boxes were spread out along the route where the carrier would have to slow down, stop, and accelerate for each one.

Thus far, we have examined carrier time per possible delivery or per box. We now turn to the carrier time per piece delivered. Table 1 (row 3) shows that carrier time per piece delivered is 12.5 seconds per piece for *all city* and 12.2 seconds for *residential city*. This contrasts with 14.9 seconds per piece for *rural routes*. Thus, on a delivered piece basis, *rural routes* use 20 percent more carrier time than do all *city routes*, and 22 percent more than *city residential routes*. The major explanation for this is fewer average pieces per possible delivery per day for rural routes (row 4).

---

[13] Part of the reason for the difference in pieces per possible delivery may be due to the fact that five percent of possible residential deliveries are businesses, and it is thought, but not known, that a lesser percentage of possible deliveries on rural routes are businesses.

2.2. Labor Cost

The previous section compared city and rural delivery on the basis of time. This section estimates postal labor delivery cost that corresponds to units of time in order to convert time into money in subsequent sections.

The Postal Service uses both full-time regular carriers and casual employees (less than full-time or temporary) on its city and rural routes. Casual employees are paid lower wages and have fewer fringe benefits. Consequently, their cost to the Postal Service is far less than for full-time employees.

Full-time rural carriers' compensation is slightly lower than full-time city carriers. They incur less overtime and the rural carrier work force has a higher proportion of casual employees. As a result, rural carrier labor cost to the Postal Service in 1989 averaged $20.60 per work hour, or 34.3¢ per minute.[14],[15] In contrast, in 1989 city carrier labor cost the Postal Service $24.49 per work hour, or 40.8¢ per minute.[16]

The difference in labor costs for rural and city carriers has its roots in the development of the two crafts. In another postal system there might be no differences in the compensation of city and rural carriers or it might be much larger. In the United States, rural wages are generally lower than urban wages.

For purposes of city and rural delivery cost analysis, we present (1) a comparison using the actual labor costs of the two crafts, and (2) a comparison using the average labor costs of all Postal Service collective bargaining employees. This will allow both an actual cost analysis and a resource comparison of city and rural routes. The average labor cost per bargaining unit employee in 1989 was $24.09 per work hour or 40.2¢ per minute.[17] This is very close to the average city carrier cost.

---

[14] Highway contract carriers have compensation much lower than rural carriers. Because they are not postal employees, we do not include them in postal labor costs.

[15] See Appendix B for derivation. Includes wages, premium payments (e.g., overtime), paid absences, basic benefits (e.g., retirement), and other benefits (e.g., workers' compensation, unfunded liability payments for retirement).

[16] See Footnote 15.

[17] See Footnote 15.

2.3. Delivery Vehicle Cost

Rural carriers furnish their own vehicles and provide all maintenance, repairs, and fuel, for which they are paid an allowance.[18] In 1989, rural carriers received an average of 34 cents per mile as a motor vehicle allowance. The average length of a rural route is 55 miles. The average annual cost per rural route is shown in table 2.

Those city delivery carriers who make use of a vehicle are furnished with one by the Postal Service which also provides all maintenance, repairs, and fuel. City carriers drive an estimated 15 miles per day. Analyzing Postal Service accounts for depreciation, fuel, and maintenance for city delivery carriers, we have estimated the average city delivery vehicle cost per route.[19] This is also shown in table 2.

Table 2

Average Vehicle Cost per
City Delivery and Rural Route
(1989)

Cost	City	Rural
Annual	$3,189	$5,677
Daily	$10.56	$18.80
Per Possible Delivery per Year	$6.40	$12.99
Per Possible Delivery per Day	2.1¢	4.3¢
Per Piece	0.4¢	1.0¢

Rural vehicle cost per box or possible delivery is twice the average *city carrier vehicle* cost per possible delivery. Rural vehicle cost per delivered piece is two and a half times city carrier cost per delivered piece. It should be borne in mind that, though the "city" column divides total city vehicle cost by

---

[18] In 1989, the rural carrier vehicle allowance was 31 cents per mile or a minimum of $12.40 per day, whichever was greater.

[19] See Appendix C.

the total number of city routes (including foot routes), only 84 percent of possible city deliveries are made by city carriers using vehicles.

2.4. Comparison of Direct Labor Plus Vehicle Cost to Serve City and Rural Areas

Table 3 combines labor cost with vehicle cost for city and rural carriers. It shows that when vehicle costs are added, the difference in cost per box per day between city and rural carriers depends heavily on which labor cost is used. Using *actual labor costs*, the city cost per box per day is 7.5 percent higher. Using the *average bargaining labor cost*, city delivery is 8 percent lower. On a cost-per-piece basis, city costs are 8 percent lower using *actual labor costs* and 21 percent lower using the *average bargaining labor costs*.

Table 3

Direct Labor Plus Vehicle Cost
for City Delivery and Rural Routes (1989)
(cents)

Cost	Actual Labor Cost		Average Bargaining Cost	
	City	Rural	City	Rural
Per Box				
Per Day	44.6	41.5	44.0	47.8
Per Piece	8.9	9.7	8.8	11.1

---

3. Relation of Rural Delivery Cost to Population Density

A priori, population density should have an important effect on rural delivery cost. We have no data available which directly relate rural delivery cost to population density, but it seems very likely that *boxes per mile* is highly correlated with *population density*.

In order to examine the impact of density on cost, rural routes have been divided into quintiles based on boxes per mile. Table 4 displays the relevant data. It can be seen that there is

wide variation between the quintiles. In the extreme, the average number of boxes per route differs by a factor of two. The average number of miles differs by a factor of 4.5. Average boxes per mile differ by a factor of nine. Moreover, with the exception of daily evaluated time and daily pieces delivered per box, the average values of all variables change monotonically. Thus, they are correlated with boxes per mile.

Table 4

Distribution of Rural Routes by Density (Boxes per Mile)
Selective Averages[a]
(1989)

Quintile	Daily Evaluated Time (Hours)	Number of Boxes	Number of Miles	Boxes per Mile	Daily Pieces Delivered per Box	Daily Evaluated Time per Box (Minutes)	Daily Evaluated Time per Piece (Seconds)
1	7.16	275.31	95.73	2.88	4.04	1.56	23.15
2	8.03	421.73	71.53	5.90	3.79	1.14	18.10
3	8.22	465.85	50.64	9.20	4.19	1.06	15.16
4	8.05	495.37	34.89	14.20	4.67	0.98	12.53
5	8.09	555.69	21.16	26.27	4.59	0.87	11.41
Total	7.91	442.79	54.79	8.08	4.30	1.07	14.94

---

[a] See Appendix A for source.

The first or least densely populated quintile stands out from the remaining four. Its time per box is half again larger than the mean for all rural routes and it is nearly two standard deviations greater than the mean for all rural routes. The other four quintiles are less than one standard deviation from the mean. Moreover, the first quintile stands apart in that its seconds per piece is also nearly two standard deviations greater than the mean, while the other four are all less than one standard deviation from the mean.[20] Thus, the two measures of cost for the first quintile are substantially greater than for the other four quintiles. This will be seen clearly in Section 4, where the profitability of rural delivery is calculated for each quintile.

It would not be surprising to find that the percentage of boxes which are businesses increases as population density increases. If this is true, it could at least partially explain why the number of pieces delivered per box is so much larger for the fourth and fifth quintile than it is for the other three.

Finally, the variability (or elasticity) of time with respect to volume for the five quintiles differs greatly:

| | | | | | All |
1st	2nd	3rd	4th	5th	Routes
.29	.37	.44	.53	.57	.44

Thus, for example, if the volume in the first quintile were to double, total cost would increase by 29 percent. The variation between quintiles can be explained by greater fixed costs in the less densely populated quintiles than in the more populated quintiles. The time required to drive the route is fixed, and driving time represents a greater proportion of total cost in the less densely populated quintiles.

Figure 1 displays the minutes per box per day as a function of density. It can be seen that time per box drops off sharply at the low end of the density spectrum and then it flattens.

---

[20] The daily evaluated time per box for all routes (1.07 minutes) has a standard deviation of 0.30 minutes. The daily evaluated time per piece for all routes (14.94 seconds) has a standard deviation of 4.64 seconds.

Figure 1
Relationship Between Density and Rural Carrier Time per Box
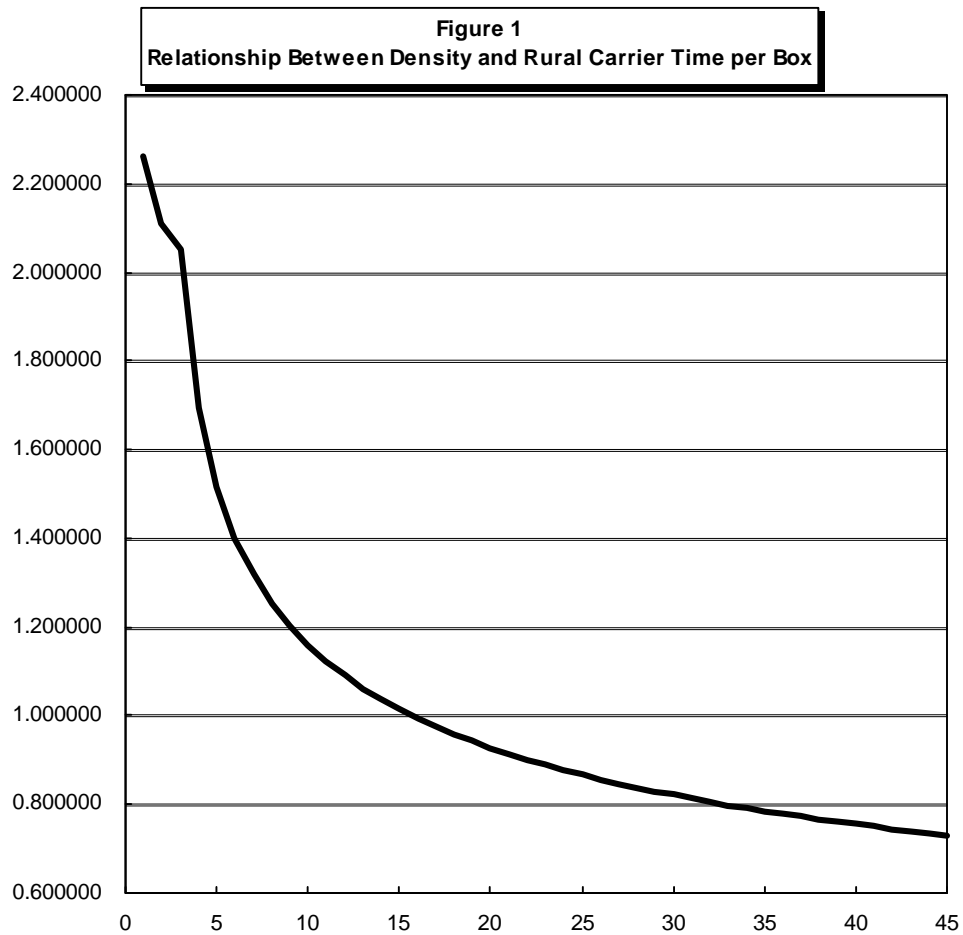
In order to isolate the effect of density on time per box, the elasticity of time per box with respect to density has been calculated using the route evaluation factors (which are used to determine rural carrier pay). Holding constant the pieces per rural box and route miles, a one percent increase in density reduces out-of-office time per box by 0.44 percent and total time per box by 0.27 percent.[21]

---

[21] The relation between time per box and boxes per mile (density) is exponential, or linear in logarithms. The Pearson correlation coefficient between the logarithmic values of the two variables is -78.60 percent. The econometrically estimated constant elasticity coefficient of a simple log-linear model with time per box as the dependent variable and boxes per mile as the explanatory variable is -27.45 percent with a t value of -266.22.

4. "Profitability" of Serving Rural Areas[22]

This section addresses the question: Does the United States Postal Service find it remunerative to serve rural areas? A revenue/cost model of rural delivery has been constructed to determine the profitability[23,24] of rural delivery by quintile. Its simple structure is presented below:

Model for Calculating Profit (Loss) Per Box

    (1)   Revenue per box per day
    (2) less   Rural delivery cost per box per day
    (3) less   Nondelivery attributable costs of mail
               delivered by rural carrier per box per day
    (4) equals Profit (loss) per box per day
    (5) times 302 (delivery days in 1989)
    (6) equals Annual Profit (loss) per box per day

---

[22] "Profit" here means contribution to fixed overhead costs over and above paying the fixed overhead of rural delivery.

[23] The model presented here is valid only for an unsubsidized postal system such as the Postal Service.

[24] The simplifying assumption is made that there is no cost difference between city and rural mail with respect to mail processing, transportation, and retail service.

Line 1—the revenue per rural box per day is calculated by multiplying average Postal Service revenue per piece (from the Revenue, Pieces and Weight Report for 1989) times the average number of pieces per box per day (from table 4). Line 2—rural delivery cost per box per day consists of (1) labor cost, (2) vehicle cost, and (3) indirect costs.[25] Labor cost per box is obtained by multiplying labor cost per minute (from Section 2.1) by the average number of minutes per box (from table 4). Vehicle cost per box per day are from table 2.[26] Because there are two labor costs per minute, one actual and the other theoretical, the model is used separately for each labor cost and provides two annual profit (loss) computations.

Line 3—here the model takes into account the cost of getting mail to the point of delivery (e.g., processing, transportation, administrative, retail, etc.). This is done by bifurcating the average attributable cost[27] per piece into delivery attributable cost[28] and nondelivery attributable cost.[29] Rural carrier cost and the nondelivery attributable cost are then subtracted to arrive at a profit (loss) per box per day.

Observers familiar with Postal Rate Commission costing procedures will recognize that rural delivery cost per box includes the attributable and institutional costs associated with that function. The Commission found in the most recent omnibus rate case (Docket R90-1), that 39 percent of rural delivery costs are attributable (i.e., vary with volume) and 61 percent are

---

[25] Appendix D presents indirect costs in more detail and shows how they are calculated.

[26] Dr. John Haldi has brought to our attention that the daily vehicle cost per box is not the same for all quintiles, as was assumed in an early version of the paper, but decreases with population density. The estimated daily vehicle cost per box in the revenue/cost model now recognizes the density differences among the five quintiles:

1st	2nd	3rd	4th	5th	All Routes
10.80¢	5.32¢	3.52¢	2.63¢	2.23¢	4.25¢

[27] Attributable costs are the postal costs causally traceable to mail. They consist predominantly of volume variable costs. The remaining costs are called institutional costs, and they can be treated as fixed. In the United States, the Rate Commission determines the attributable cost for each class and subclass of mail. Its most recent analysis is contained in the Docket R90-1 Opinion and Recommended Decision.

[28] These are the attributable (direct and indirect) costs arising from the delivery function. We have estimated them for purposes of this analysis.

[29] These are total attributable costs minus delivery attributable costs.

institutional (i.e., nonvariable).[30]   Because such a large
percentage of the costs are fixed, the profitability calculation
is sensitive to both the average revenue per piece and the average
pieces per box.   If the postal system operated at a lower scale,
revenue per piece would need to be higher to maintain the same
revenue cost balance.   It is not clear, without further analysis,
what would happen to profitability if the system operated at a
lower scale.[31]

     The average revenue per piece for the entire Postal Service is
used to estimate the average revenue per box.   We have no
independent estimate of the average revenue for mail delivered by
rural carriers.   If mail delivered by rural carriers has a
different composition   compared to the system as a whole,
profitability conclusions would vary.   In that case, the
nondelivery attributable costs would vary in the same direction as
revenue, but not by enough to offset the revenue change.

     Table 5 provides both the input and output for the
profitability calculations for all rural routes in 1989.   It can
be seen that by serving all rural routes and using actual labor
costs, the Postal Service realized an average profit of 10.8 cents
per box per day, or a total annual profit for all rural routes of
$669 million.   To put this figure in perspective, the total
accrued expenditures for the Postal Service in 1989 were $39
billion.[32]

     Table 5 shows that, using the average labor cost for all
bargaining employees, the profit drops to $283 million.   The
profit from serving all rural routes is obviously highly sensitive
to the labor cost of rural carriers.   However, using either labor
cost figure, rural delivery was profitable for the Postal Service.
 If, in 1989, the Postal Service's overall surplus had been much
larger, the profit from rural delivery would no doubt have been
greater.   Conversely, if the year had been one in which the
Service had a sizeable deficit, rural delivery would have been
less profitable.   Fortunately for purposes of this analysis, the
Service essentially broke even in 1989 and so the profit from

---

[30] In Docket R90-1, the variability or elasticity of evaluated rural route
costs with respect to volume was estimated at 44 percent by the Postal
Service.

[31] It does seem clear that the ratio of mail delivered to rural boxes to
mail delivered to city addresses is an important factor in determining
profitability.

[32] The Postal Service surplus for 1989 was under $100 million.

rural delivery need not be interpreted based on the Postal Service's overall financial results.

Table 6 displays the profitability of all five quintiles of rural routes (based on population density) using both actual compensation and average bargaining compensation. It can be seen that the profit per box differs substantially from the first (or least densely populated) quintile of rural routes to the fifth (or most densely populated) quintile. Using *actual labor cost* only, the first quintile was unprofitable, while, using *average bargaining labor cost*, the first two quintiles were unprofitable.

Because the most densely populated quintiles of routes serve more boxes, their total profit is disproportionate to their per-box profit. Using either labor cost, the third, fourth, and fifth quintiles were profitable.

Table 5

Profit (or Loss) from
All Rural Routes
(1989)

Per Piece Revenue and Cost Data
         (cents)

Revenue	23.77
Attributable	16.09
Institutional	7.68
Delivery attributable	4.82
Nondelivery attributable	11.27

Rural Carrier Data

Average pieces/box/day	4.30
Average minutes/box/day	1.07
Vehicle cost/box/day (cents)	4.25
Average number boxes/route	442.79
Total number of routes	46,197

	Using Actual Labor Costs	Using Average Bargaining Labor Costs
Cost/Minute Data		
Annual labor cost	$38,093	$43,250
Annual work hours	1,849	1,795
Hourly cost	$20.60	$24.09
Cost/minute (cents)	34.3	40.2
Profitability Calculation (cents)		
Revenue/box/day	102.310	
	102.310	
Cost/box/day:		
Labor	36.802	43.041
Vehicle	4.245	4.245
Overhead	1.930	1.930
Total	42.977	49.216
Nondelivery attributable cost/box/day	48.506	48.506
Total cost/box/day	91.483	97.772
Profit/box/day	10.827	4.588
Total annual profit (millions)	$668.857	$283.423

Given the assumptions discussed above, rural delivery is remunerative and it is unlikely that it would be abandoned if the universal service requirement were eliminated. Some observers, however, might expect the Postal Service to either drop or reduce the level of service to the boxes in the first or second quintiles of rural routes. The first quintile comprises only 2.5 percent of all addresses served by rural and city carriers combined. The second serves 3.9 percent.

Table 6

Profit (Loss) from Rural Delivery
by Quintile for Actual Labor Cost
and Average Bargaining Labor Cost
(1989)

Quintile	Pieces Per Box	Minutes Per Box	Actual Labor Cost		Average Bargaining Labor Cost	
			Per Box	Total (mil)	Per Box	Total (mil)
All	4.30	1.07	10.8¢	$669	4.6¢	$283
1	4.04	1.56	(15.8)	(121)	(24.9)	(191)
2	3.79	1.14	0.9	10	(5.8)	(68)
3	4.19	1.06	10.6	137	4.4	57
4	4.67	0.98	20.4	281	14.5	200
5	4.59	0.87	23.3	361	18.2	282

---

5. Concluding Remarks and Summary

5.1. Concluding Remarks

While the boxes served by the quintile of routes serving the least densely populated areas are unprofitable, we believe that it is unlikely that the Postal Service would discontinue service to them (or try to decrease their level of service) if the universal service requirement were eliminated.

- The total loss on those boxes is small relative to total costs of the Postal Service.

- Because these routes are scattered all over the country, boxes on these routes are not easily identifiable without consulting an extensive list. Consequently, it would be costly for firms to separate mail addressed to these boxes from their remaining mail.

- The transaction costs involved in putting pieces addressed to boxes in the first quintile of rural routes in the hands of another delivery firm, which would serve these addresses, would also be high.

- If these addresses were dropped from the delivery network, it would likely reduce the volume of mail sent by these addresses to the remaining portions of the delivery network. Thus, profitable volume would be lost.

Perhaps the above four points are simply underlying reasons for the truism that for common carriers serving the general population, larger service networks (be they mail, package, overnight, or telephone) are more valuable to customers and providers than smaller service networks. It is no accident that, within the United States, United Parcel Service provides ubiquitous service for parcels.[33] Federal Express and other overnight carriers do the same for overnight delivery. Moreover, the major long distance telephone carriers also provide ubiquitous service. Quite possibly, all of these common carriers find that sparsely settled portions of the country are unprofitable to serve. That these organizations provide universal service suggests that rural areas would receive postal service even absent a universal service requirement.

5.2. Summary

- In the United States postal system, there is no real difference in the carrier time required to serve city and rural addresses.

- The average city delivery cost reflects the higher cost of serving businesses compared to residences.

- Rural delivery cost reflects a lower level of service than city delivery.

---

[33] UPS does not provide parcel service at the ordinary rate to the Alaska bush where there are no roads and service must be provided by air.

- Because fewer pieces are delivered per box on rural routes than per possible delivery on city routes, the per piece delivery cost is higher for rural routes than for city routes.

- The cost of delivery per box for the least densely populated quintile of rural routes is much higher than the average for all rural routes.

- The revenue from mail delivered to rural areas as a whole exceeds the cost of handling and delivering that mail.

- There is a loss on serving the least densely populated quintile of rural routes.

- It is likely that if the universal service requirement were eliminated, even the most sparsely populated rural areas would receive service.

Appendix A. Major Data Sources

A.1. City Delivery Carrier Data

The 1989 city delivery carrier data used in this paper are based on information from several Postal Service data systems. Total city delivery carrier work hours[a] come from payroll hours accounting systems data made available in the most recent rate proceeding. These work hours are apportioned among city delivery carrier route types on the basis of cost allocations from the In-Office Cost System,[b] an ongoing work sampling system that is used to allocate costs for certain labor crafts among different activities and rate categories for ratemaking purposes.

Information concerning the total number of possible deliveries is taken from the 1989 City Delivery National Totals Report. Carrier Cost System (CCS) data are used to allocate total possible deliveries among different route types and to determine the average pieces per possible delivery for different delivery and route types on letter routes. The CCS is used in rate cases to determine attributable costs and associated distribution keys for certain city carrier activities. CCS data are collected throughout the year from over 500 thousand sampled stops on city delivery letter routes.

A.2. Rural Delivery Carrier Data

Most rural routes are evaluated routes. Evaluated routes are those routes for which the rural carrier's annual salary is calculated using a set of standard time allowances. Time standards are applied to workload elements (e.g., mileage, delivery boxes, quantity of mail by shape, etc.) to calculate the total evaluated time required to serve a rural route, and thus the salary of the carrier serving that route.

To measure the workload elements needed to calculate the evaluated time, a National Mail Count for most rural routes is conducted periodically in accordance with the labor agreement between the United States Postal Service and the union of rural carriers. The statistics on rural routes presented in this paper are based on the 1989 National Mail Count data.[c]

---

[a] Docket R90-1, USPS-LR-F-342.

[b] Docket R90-1, USPS-T-13, W/S 7.0.7, p. 1.

[c] The Postal Service used a sample of the 1989 National Mail Count data to measure the elasticity (variability) of rural carrier costs with respect to mail volume. Docket R90-1, USPS-T-13, Appendix F.

The 1989 National Mail Count was conducted for 24 delivery days from September 5 to October 2, 1989, and included 44,775 rural routes out of a total of 46,197. Data for a few of the counted rural routes appeared to be internally inconsistent. Counted
routes that had one or more of the following properties were deleted:[d]

- Less than one mile on the route.

- No boxes on the route.

- No letters on the route.

- No actual time on the route.

- A difference between weekly actual and evaluated time greater than 1,000 minutes.

This edit resulted in 931 deletions. Data from the remaining 43,844 rural routes were used to calculate the statistics presented in this paper.

---

[d] The Postal Service performed a similar edit on the sample of routes selected for measuring the elasticity of rural carrier costs. Docket R90-1, USPS-T-13, Appendix F, p. F-8.

Appendix B. Calculation of Labor Costs Per Work Hour (FY 1989)

Item	USPS Bargaining				Rural Carriers				City Carriers			
	Cost (000s)	Hours (000s)	$/Hour	$/Year	Cost (000s)	Hours (000s)	$/Hour	$/Year	Cost (000s)	Hours (000s)	$/Hour	$/Year
Straight Time Work	$15,691,389.7	1,207,049.4	12.9998		$1,331,872.2	107,093.8	12.4365		$5,363,971.3	405,150.5	13.2395	
Straight Overtime	861,190.9	65,967.2	13.0548		18,066.0	1,573.4	11.4821		362,183.9	27,751.4	13.0510	
Straight Holiday	103,888.2	7,782.2	13.3495		491.9	32.6	15.0890		15,186.4	1,124.4	13.5062	
Training	133,855.3	10,226.8	13.0887		0.0	0.0	0.0000		29,147.6	2,475.4	11.7749	
Total	$16,790,324.1	1,291,025.6	13.0054		$1,350,430.1	108,699.8	12.4235		$5,770,489.2	436,501.7	13.2199	

Benefits:												
Premium Pay[a]	$ 984,197.4				$ 9,020.3				$ 196,515.1			
Paid Absence[b]	650,966.1	48,653.1			49,275.3	3,641.9			218,818.0	16,356.6		
Basic Benefits[c]	4,060,509.3				264,128.5				1,487,217.7			
Accrued Annual Leave	1,492,955.6	110,962.4			92,054.0	6,804.0			528,070.0	39,290.6		
Accrued Holiday Leave	609,986.6	45,113.2			41,858.4	3,138.9			215,500.4	15,874.6		
CS Retirement Liability[d]	1,431,205.9				120,502.5				483,897.3			
Workers Compensation	599,408.4				50,468.1				202,662.7			
Unemployment Compens.	27,767.9				2,338.0				9,388.5			
Repriced Annual Leave	61,605.1				5,186.9				20,829.0			
Holiday Leave Variance	1,316.2				110.8				445.0			
Thrift Plan - FERS	134,110.6				5,373.8				49,855.2			
Total	$10,054,029.1	204,728.7			$640,316.6	13,584.8			$3,413,198.9	71,521.8		

			$/Hour	$/Year			$/Hour	$/Year			$/Hour	$/Year
Straight Time Wk. Hr. Rate			13.0054	27,051			12.4235	25,841			13.2199	27,497
Wk.Hr. Rate/Incl. Prem.			13.7678	28,637			12.5065	26,013			13.6701	28,434
Wk.Hr. Rate/Incl. Prem.&Bas.Ben.			19.1499	34,380			16.6711	30,824			19.3962	34,664
Pd.Hr. Rate/Incl. Prem.&Ben.			20.7930	43,250			18.3142	38,093			21.0393	43,762
Wk.Hr. Rate/Inc. Prem.&Ben.			24.0904				20.6030				24.4866	

[a] Premium payments are: Overtime premium, night differential, Sunday premium, and other premium.

[b] Paid absence is: Sick leave taken, continuation of pay, military leave, and other leave.

[c] Basic benefits are: Civil Service Retirement - 7% contribution; FERS Retirement, health benefits, life insurance, Medicare, Social Security (including FERS), and uniform allowance.

[d] Current portion of unfunded Civil Service Retirement liability plus interest.

Appendix C. Development of City Delivery Vehicle Costs (FY 1989)

Line No.	Item	City Delivery Accrued Costs
1	City Delivery Vehicle Costs (000)[a]	$499,872
2	City Delivery Letter Routes[b]	156,750
3	Vehicle Costs/Letter Route[c]	$ 3,189
4	Number of Delivery Days[d]	302
5	Vehicle Costs/Letter Route/Day[e]	$10.5595
6	Number of Possible Deliveries (000)[b]	78,078
7	Vehicle Costs/Possible Delivery/Year[f]	$ 6.4022
8	Vehicle Costs/Possible Delivery/Day (cents)[g]	2.1199
9	Vehicle Costs/Possible Delivery/Day/Piece (cents)[h]	0.4231

---

[a] PRC Library Reference 5, Docket R90-1.

[b] USPS City Delivery Statistics National Totals, FY 1989.

[c] L.1/L.2.

[d] Six (6) delivery days per week times 52 weeks less 10 holidays.

[e] L.3/L.4.

[f] L.1/L.6.

[g] L.7/L.4.

[h] L.8/5.01. The denominator (5.01) is the average number of pieces per day per possible delivery for city delivery routes from table 1.

Appendix D. Development of Rural Carrier Overhead Costs
(FY 1989)

Line No.	Item	Rural Carrier Accrued Costs
1	Supervision (000)	$ 71,495
2	Space & Space-Related (000)	15,959
3	Servicewide Labor-Related (000)[a]	32,014
4	Total	$119,468
5	Number of Boxes Served (000)[b]	20,456
6	Overhead Cost/Box[c]	$5.84024
7	Number of Delivery Days[d]	302
8	Overhead Cost/Box/Day (cents)[e]	1.93386

---

[a] Costs for rural carriers estimated as a percentage of rural carrier direct labor costs to total labor costs.

[b] 46,197 rural routes from the USPS FY 1989 Rural Delivery Statistics National Report times 442.79 (the average number of boxes served per route) from the 1989 Rural Carrier National Mail Count.

[c] L.4/L.5.

[d] Six (6) delivery days per week times 52 weeks less 10 holidays.

[e] L.6/L.7.