

A Comparison of the Burden of Universal Service in Italy and the United States^{*}

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1. INTRODUCTION

Samuel Johnson said *Patriotism is the last refuge of a scoundrel* and many postal observers believe that the Universal Service Obligation (USO) is the last refuge of a postal service wishing to protect inefficiency, monopoly profits, or economic rents. Despite inefficient service, opaque accounts, and large rents, many postal officials maintain that the monopoly, whatever its faults, is the only means of ensuring universal, affordable postal service for citizens throughout the nation. Without the monopoly, they argue, the post office would be crushed by the cost of the USO. This paper examines when this argument might be valid.

All posts probably have some cost associated with the USO, but it has been difficult to quantify. We agree with John Panzar (2001) that the cost of the USO is the cost of the services that would not be provided in a competitive market. Under this definition, in practice, there has been no discernable USO cost. Competition exists in both Sweden and New Zealand and the incumbent posts have continued to provide universal service with no subsidy.

The USO as defined by the proponents of the monopoly goes well beyond ubiquitous service. It also includes a uniform price with respect to location of the recipient¹ and a uniform frequency of delivery. These conditions might have been appropriate a century ago when the post was the primary means of communication. Today however, this definition seems unduly restrictive. It is incumbent on defenders of the restrictive definition of USO to explain why postal service should be treated

^{*} The views expressed in this paper are those of the authors and do not necessarily represent the opinions of Poste Italiane or the Postal Rate Commission.

¹ In other words a firm cannot charge more for delivering similar items to addresses in one section of the country than another. Under this definition United Parcel Service (UPS) is not a true universal service provider because it imposes a surcharge for residential delivery. This is ironic because UPS delivers to every address in the continental U.S. and delivers right to the door. The Postal Service which is a universal service provider under the definition used here, delivers to mail boxes that are, in many cases, remote from the actual address.

differently from other important products such as groceries, bank accounts and internet service.² Notwithstanding, we use this restrictive definition of universal service for this paper.

The obligation to provide ubiquitous service is not in itself onerous. It has been pointed out by the American co-authors of this paper that a post could rationalize its delivery costs by reducing the frequency of service on unprofitable routes to the point where they become profitable (Cohen et al. 2000). A post could also rationalize its prices by reflecting the cost of service to different areas. The restrictive definition of the USO does not allow a post to rationalize either its cost or pricing structure,³ thus, creating cream-skimming opportunities under liberalization. The burden that the restrictive USO imposes on a post is the increase in its unit costs resulting from cream skimming under liberalization caused by the requirements of uniform pricing and levels of service. We use the term “burden of the USO” to distinguish our concept from other papers that use the term “cost of the USO.”

We believe that insights into the burden of the USO can be gained by comparing postal systems. Assuming that the keenest insights can be gained by comparing systems with large differences, the Italian and United States systems are good candidates. The U.S. has the highest volume per capita in the industrial world (739 pieces in 1999), while Italy has one of the lowest (115 pieces in 1999).⁴

Previous work by Cohen et al. shows that the U.S. Postal Service (USPS) is not likely to require the monopoly to continue to satisfy the USO. (Cohen 1999, 2000) However, this result may not apply to all posts and it is important to distinguish magnitudes of burden for different posts. To this end, we develop a model to determine the USO burden for posts with different per capita volumes. In particular, applying the model demonstrates that the burden of USO is very great for Poste Italiane and other posts with small per capita volumes. On the other hand, for the U.S. and other posts with large and medium per capita volumes the burden is small.

We first compare some statistics for Italy and the U.S. We then examine the consequences of volume loss on postal systems in order to provide a measure of burden in terms of increases in average unit costs as volume is lost to competitors, or

² Many postal services are increasingly becoming primarily carriers of advertising. U.S. households receive far more advertising than letters, bills or other similar matter. According to the Household Diary Study (United States Postal Service 2000), in 1999, 56 percent of the pieces received by U.S. households were advertising mail.

³ An apparent exception is Consignia. It rationalizes its delivery cost by delivering twice a day in most urban areas and once a day in rural areas.

⁴ Italy has a very undeveloped direct mail market and the Italian monopoly does not include direct mail. The U.S. monopoly includes all addressed direct mail consisting of fewer than 24 pages. The U.S. Postal Service handled 314 pieces per capita of direct mail in 1999.

equivalently, the increase in average rates for the volume remaining.⁵ Next we introduce the concept of delivery route profit and quantify the relative profits from delivered mail and mail not requiring delivery in both Italy and the U.S. We then compare the distribution of profit margins for routes in Italy and the U.S. and the effect this has on vulnerability to cream skimming. Finally, we discuss two measures of the cost of universal service, the entry pricing measure and the net avoided cost measure in the context of delivery profits. We compare them with our burden measure for the Poste Italiane and the U.S. Postal Service.

Our principal findings are:

The burden of the USO is much greater for small per capita volume posts than it is for large and medium per capita volume posts.

The likelihood of a graveyard spiral resulting from volume loss to cream skimmers is remote for medium to large volume per capita posts; whereas it is a real threat to small volume per capita posts.

The measure of burden presented here combined with the distribution of route profit margins for Poste Italiane and the U.S. Postal Service yields results contrary to the entry price and net avoided cost measures for the cost of the USO.

The portion of mail not requiring delivery is a very important contributor to the finances of a post.

2. COMPARATIVE STATISTICS

Table 1 contains some statistics for Italy and the U.S. and for their postal administrations.⁶ Italy has 21 percent of the U.S. population and 16 percent (approximately one seventh) of the U.S. per capita volume. Most of the delivery statistics in the table's second section are reasonably close to this 16 percent figure. The number of delivery points in Italy, as a percentage of those in the U.S., is a

⁵ To provide a basis for comparing Poste Italiane and the U.S. Postal Service, we use a model of postal operations that follows the structure of FY 1999 costs in the U.S. Postal Service. Parametric analyses are conducted by varying volume under different assumptions about the extent that institutional cost varies over the long run. The model is validated for Poste Italiane by making adjustments for major differences in the two posts, such as the extent of worksharing.

⁶ Prices of goods and services vary between Italy and the United States, and the prevailing market exchange rate does not necessarily account for the relative differences in prices. We have used the Purchasing Power Parity (PPP) of 1,677 liras per U.S. dollar to convert the 1999 Italian statistics reported in Italian liras. The PPP has been produced by the Organization of Economic Co-Operation and Development (OECD) and shows the number of Italian liras required in 1999 to buy goods and services equivalent to what can be purchased with one U.S. dollar. In 1999, the average market exchange rate, reported by the International Monetary Fund (IMF), was 1,817 liras per U.S. dollar.

disproportionately high 25 percent. The disproportionate number of small business addresses in Italy (Scarfiglieri and Visco Comandini 2001) may help explain this.

Poste Italiane also has disproportionately more delivery points per route. This results from a much lower coverage (percent of addresses receiving mail on a given day), a higher population density and other unexplored route and topographical considerations.⁷ We see in the fourth section that the U.S. Postal Service cost per piece is much lower than Poste Italiane cost per piece despite having a much higher labor cost per employee. This is primarily a result of economies of scale, worksharing and the extensive use of automation.⁸

Table 1. Selected National and Postal Statistics for FY 1999^a

	Italy	U.S.	Italy as Percent of U.S.
Population	57,679,895	272,691,000	21
Area (Square Miles)	116,347	3,675,031	3
Population/Square Mile	496	74	668
Number of Households	21,211,334	103,620,000	20
Annual Mail Volume: (Millions)			
Delivered	5,745	158,435	4
Non-delivered	917	43,209	2
Total Volume	6,662	201,644	3
Pieces per capita	115	739	16
Delivered Pieces per Capita	100	581	17
Pieces per Household	314	1,946	16
Delivery Points (Addresses)	28,029,808	110,454,717	25
Delivered pieces per Delivery Point (Address)	205	1,434	14
Number of Carrier Routes:	40,681	230,265	18
Delivered Pieces per Route	141,221	688,055	21
Delivery Points (Addresses) per Route	689	480	144
Number of Postal Employees	124,382	905,766	14
Population per Postal Employee	464	301	154
Pieces per Postal Employee	54	223	24
Retail Units	13,976	38,159	37
Retail Units per Hundred Thousand People	24	14	173
Annual Revenue (\$ millions)	4,274	62,811	7
Revenue per Piece (cents)	64	31	206
Annual Costs (\$ millions)	5,273	62,392	8
Costs per Piece (cents)	79	31	256

^a A purchasing power parity index is used to convert Italian liras to U.S. dollars.

Finally we note that the number of retail units (per 100,000 population) operated by Poste Italiane is much larger than the number operated by the U.S. Postal Service. This illustrates the fact that the USO has different meanings in different countries. It

also illustrates that the concept of the USO has many more dimensions than ubiquitous delivery. However, the cross-subsidy that results from ubiquitous delivery and uniform prices and frequency of delivery is widely regarded as the most important aspect of the USO mitigating against liberalization. This paper will be restricted to dealing with this aspect.

⁷ Motorcycles are the primary means of carrier transport in Italy and automobiles are the primary means in the U.S.

⁸ It is also the result of the quantity of non-delivered mail (*See* Section 4).

3. RELATIVE IMPACT OF VOLUME LOSS ON POSTAL SYSTEMS

The burden of the USO on a postal system lies within its fixed costs. *Ceteris paribus*, unit (per piece) fixed costs are higher in a low volume per capita system than in a high volume per capita system. We examine the effect of volume on unit total costs.

The sensitivity of cost to volume for a postal system can be investigated directly provided the ratio of fixed to variable costs is known by function. Some postal administrations do not have this information and some choose not to make it available to regulators or the public. Consequently, we have built a model to estimate the relationship between unit average costs and per capita volume.⁹ The model is described in the appendix and includes parameters for the portion of variable costs by major postal functions. When the average unit cost is graphed as a function of volume per capita one obtains a curve with a parabolic shape. The exact shape of the curve depends on the specific set of parameters used to benchmark the model, such as the proportion of fixed costs at a specific per capita volume. Because the cost behavior of the U.S. Postal Service has been studied extensively and because U.S. postal costs are the most transparent in the industrialized world, we use U.S. data from 1999 as provided in the most recent omnibus rate proceeding, Docket No. R2000-1 to benchmark the model¹⁰ Table 2 shows the U.S. institutional/variable percentages for the major postal functions.

Table 2 : U.S. Fixed/Variable Cost By Major Function^a
(FY 1999)

Function	Fixed (Percent)	Variable (Percent)	Total Cost (\$ Billions)
Delivery^b	52	48	22.1
Mail Processing	4	96	21.4
Transportation	8	92	4.3
Window Service	54	46	3.1
Other	77	23	11.5
Total	37	63	62.4

^a Source: Postal Rate Commission Docket No. R2000-1

^b Delivery includes in-office and out-of-office costs.

Because the U.S. Postal Service may differ greatly from other postal systems in labor cost, automation, route topography, worksharing, mix of mail by shape, and the percentage of non-delivered mail, etc., we cannot expect the cost estimates furnished by the model to be extremely accurate estimates of particular non-U.S. systems. For our

⁹ We use pieces per capita rather than total volume to normalize the volume.

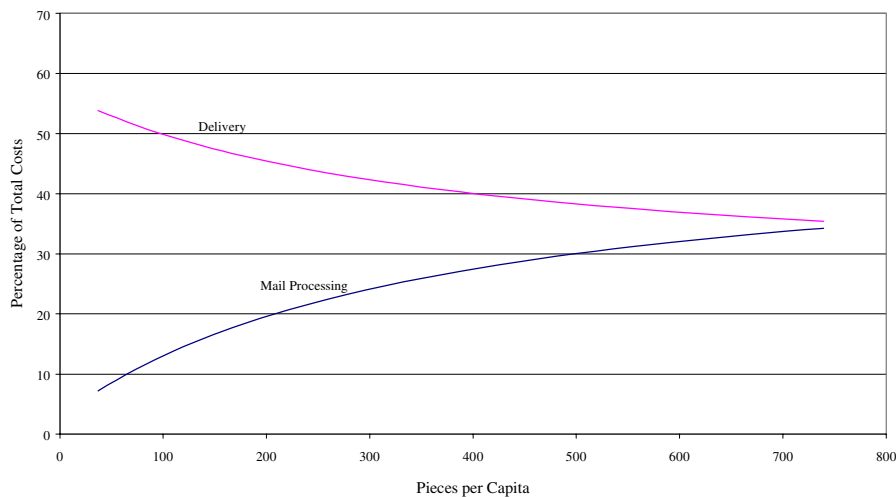
¹⁰ This model has been developed on the assumption that the cost behavior of postal administrations is essentially similar. The functions of collection, delivery, transportation, processing and window services are common to the postal administrations of all industrialized countries.

purposes we do not need great accuracy, we only need reasonable estimates in order to examine the sensitivity of total unit cost to volume per capita.

The fixed portion of non-delivery costs would be expected to change as we move from higher volume administrations to lower volume ones. It would be expected that lower volume postal administrations would try to keep them small to reduce the burden on rate payers. Since these costs are variable in the long run and we do not know how other postal administrations deal with them, we parameterize them for purposes of modeling.

As a preliminary matter, using the fixed/variable ratios for U.S. Postal Service costs from Table 2, Figure 1 shows that as per capita volume increases, the mail processing proportion of total cost will increase and the delivery proportion will decrease. This is because mail-processing costs are almost all variable while delivery costs have a very large fixed component. Since the U.S. volume per capita is the highest in the world, the U.S. Postal Service delivery costs proportion should be the smallest of any postal service. On the other hand, Poste Italiane per capita volume is among the lowest in the industrialized world, and so its delivery costs proportion should be among the highest.

Figure 1: Functional Percentage of Total Costs
 Benchmarked by U.S. Costs and Volumes with
 25% of Non-Delivery Institutional Costs Long-Run Variable



Again using the ratios for U.S. Postal Service costs in Table 2, Figure 2 shows the variability of the major functions as per capita volume changes. It can be seen that at low volumes, mail processing and transportation costs have a high degree of fixity while at high volumes they are almost all variable.

Figure 2: Modeled Variabilities by Function
 Benchmarked by U.S. Costs and Volumes with
 25% of Non-Delivery Institutional Costs Long-Run Variable

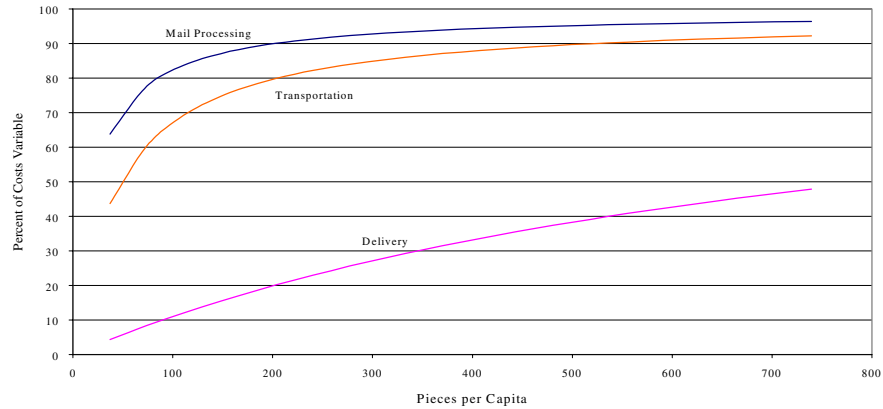
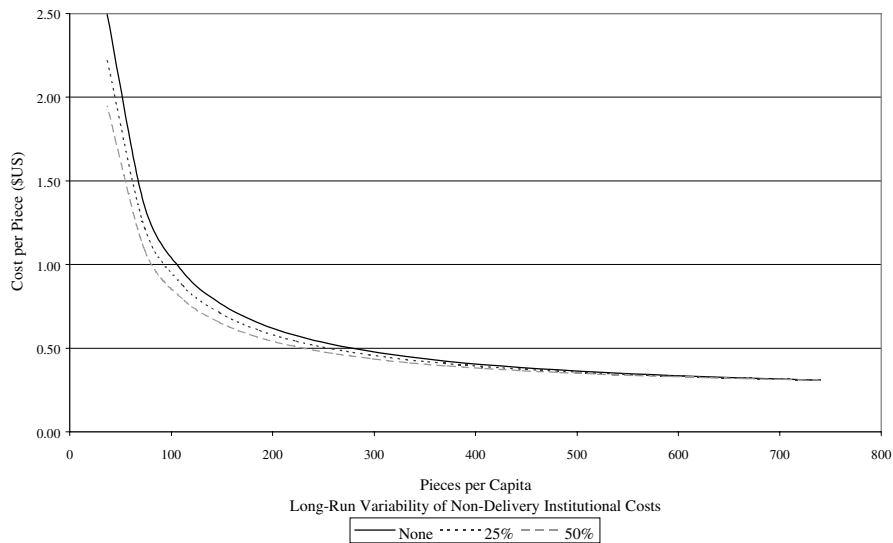


Figure 3 shows the impact of per capita volume on average unit costs. The three curves represent different variabilities of non-delivery fixed costs as shown in the legend. It appears that unit costs are not very sensitive to changes in per capita volume at the high end but are quite sensitive at the low end. For example, a ten-percent reduction in pieces per capita for the U.S. Postal Service would result in costs increasing about one cent. A ten-percent reduction for a post at 100 pieces per capita would increase unit costs by nine cents. The increase in unit cost resulting from a ten-percent decrease in per capita volume for a range of volumes is shown in Table 3.

Figure 3: Model Estimates of Unit Cos
 Benchmarked by U.S. Costs and Volumes



In the per capita volume range of most Northern European countries, Canada, New Zealand and Australia, the effect on unit cost from a ten-percent reduction in per capita

volume is not great. At about 200 pieces per capita the effect of volume loss on unit cost becomes much more pronounced.¹¹

Table 3: Unit Cost with 10% Decrease in Volume
 Assuming 25% of Non-Delivery Institutional Costs are Long-Run Variable
 (1999 U.S. Dollars)

	Pieces per Capita						
	700	600	500	400	300	200	100
Base unit cost	0.32	0.33	0.36	0.40	0.46	0.59	0.97
Unit cost with 10% volume loss	0.33	0.35	0.38	0.42	0.49	0.63	1.06

When volume is lost to cream skimmers because of the USO, net revenue losses (revenue minus cost) must be made up from the remaining volume to maintain breakeven status. The burden measure quantifies the resulting increase in unit cost and revenue that must be made up from each piece of mail that remains in the system. An important question is whether the rate increases would lead to a graveyard spiral. We think the burden measure provides an answer to this question.

Insofar as the burden of the USO might introduce a death spiral (Crew and Kleindorfer 2000) owing to the loss of volume because of liberalization, the probability seems slight until per capita volumes are in the 100 to 150-piece range. Below that point the possibility of a death spiral increases rapidly. Thus, we conclude that the burden of the USO is much greater for low per capita volume posts than for medium to high volume ones.

In order to make the model more useful for comparing Poste Italiane and the U.S. Postal Service we adjust model costs to account for important known differences. Since worksharing activities reduce United States costs by about 25 percent (Cohen et al. 2001), we increase model costs to account for the lack of worksharing in Italy. The portion of the model costs that are labor costs is adjusted downwards to reflect hourly labor cost differences between Poste Italiane and the U.S. Postal Service. In addition, model costs are adjusted to reflect the Poste Italiane proportion of low-cost letters (and cards), medium-cost flats, and high-cost parcels. The appendix describes the adjustment factors. Table 4 shows estimates of Poste Italiane unit costs derived using the model.

It can be seen that the model comes fairly close to Poste Italiane unit costs. Of course the model could be further refined to account for many more specific differences. We leave that project for another day. Nonetheless, we think the model is sufficiently accurate to allow us to draw a major conclusion: the burden of universal service is highly dependent on volume per capita, so policies suitable for liberalizing medium and large per capita volume posts are likely not suitable for small per capita volume posts.

¹¹ Greece, Italy, Portugal, and Spain have per capita volumes below 200.

Table 4: Model Estimates of Poste Italiane Unit Costs
Based on U.S. Costs and Variabilities
Adjusted for Worksharing, Wage Differences, and Mail Mix

<u>Long-Run Variability of Non-Deliv. Inst. Costs</u>	<u>Unit Costs (\$ per piece)</u>		
	<u>Attributable</u>	<u>Institutional</u>	<u>Total</u>
0%	0.19	0.59	0.78
25	0.19	0.53	0.72
50	0.19	0.47	0.66
Actual Unit Cost			0.79

4. PROFITS FROM DELIVERED AND NON-DELIVERED MAIL

Because of the interest in the USO and cross-subsidy within the delivery system, it is important to define the concept of route profit (and loss). We define the profitability of a delivery route as the revenue generated by the mail delivered on the route minus the attributable upstream costs of the mail delivered and the total cost of the route (Cohen et al. 1999). Some mail handled by a postal service does not require delivery; recipients pick up mail from post office boxes and large volume recipients pick up mail in bulk from designated counters.¹² Non-delivered mail can also be considered to have delivery profits in the same manner as delivered mail.¹³

A postal service has variable and fixed upstream costs as well as variable and fixed delivery costs. In a breakeven postal service total delivery profits from all routes plus profits from non-delivered mail must equal fixed upstream costs.¹⁴ Put another way, fixed upstream costs minus profits from non-delivered mail must equal delivery profits.

In order to compare profits from delivered and non-delivered mail in Italy and the U.S. we increase Poste Italiane revenue by 24 percent so that it equals cost and is thus at breakeven.¹⁵ Table 5 shows that non-delivered mail accounts for a very disproportionate share of delivery profits in both posts (and presumably in all posts). The most obvious reason for this is that non-delivered mail incurs no carrier delivery cost. In addition, although many delivery routes are highly profitable, losses from unprofitable routes reduce the net delivery profit from delivered mail.

¹² In the United States, this is frequently called "firm holdout" mail.

¹³ Revenue minus attributable upstream costs that includes the small amount of costs for non-carrier box or counter delivery activities associated with non-delivered mail.

¹⁴ An analogous identity holds for a post at any given profit (loss).

¹⁵ Data in this paper are from 1999. In that year, the U.S. Postal Service had profits of \$400 million and total revenue of \$62.8 billion.

Table 5: Distribution of Volume and Profits between Delivered and Non-delivered Mail (Percent)

	<u>Italy</u>		<u>U.S.</u>	
	Volume	Profits	Volume	Profits
Delivered	86	58	79	33
Non-delivered	14	42	21	67

Because total delivery profits from delivered and non-delivered mail must equal fixed upstream costs, non-delivered mail plays an important role in reducing the revenue needs of a breakeven post. *Ceteris paribus*, the higher the proportion of non-delivered mail, the lower the rates that a breakeven post must charge. Thus, the higher the proportion of non-delivered mail, the less opportunity there is for a cream skimmer to undercut the incumbent.^{16,17} Moreover highly profitable non-delivered mail is much less vulnerable to diversion.¹⁸

5. DISTRIBUTION OF ROUTE PROFIT MARGINS AND VULNERABILITY TO CREAM SKIMMING

Volumes, revenues and route profits differ widely on routes in both Italy and the U.S. The uniform pricing constraint of the USO creates cream skimming possibilities because an entrant can target only highly profitable routes and charge a price below the uniform price. Consequently, it is not cross-subsidy *per se* that allows cream skimming. All routes could be above incremental cost and the problem would still exist. Cream skimming stems from the uniform pricing and service constraints given that routes have disparate profits, and not necessarily from the need to cross-subsidize routes.

¹⁶ We would expect that the USPS's percentage of non-delivered mail to be among the highest of industrialized country posts because the U.S. payment system involves a large fraction of financial transactions paid by check and mailed to large volume recipients. This mail is generally picked up by them (or their agents) at a post office (i.e., it is non-delivered mail).

¹⁷ In a small per capita volume post, the fixed cost of delivery represents a larger share of total cost than in a large per capita volume post. *Ceteris paribus*, per piece profit from non-delivered mail is greater in a small per capita volume post than in a large one.

¹⁸ Many of the 18 million boxholders in the United States do not want mail delivered to their premises. We cannot quantify the number, but presumably, this is an important reason why mail recipients rent a post office box. These box holders would not be good candidates for cream skimmers. Fifty-six percent of non-delivered mail is single piece. It is not likely that cream skimmers would be able to successfully put a collection system in place to capture much of this mail. Of the 44 percent of non-delivered mail that remains, 36 percent is First Class, much of which is time sensitive. According to most models of cream skimming, delivery frequency would be reduced. Time sensitive First Class would be less likely to make use of a service with less frequent delivery. Finally, non-single piece mail addressed to box holders is being transported and delivered over large areas of the nation. A delivery cream skimmer would have to have a national presence to compete for this mail. This means much of the mail could not be handled by local niche players or even regional cream skimmers.

The more revenue that leaves the system because of cream skimming, the more rates must be increased on the remaining mail to maintain a breakeven status. Consequently, the greater the share of system-wide revenue that is from high margin routes, the greater impact that cream skimming could have on a postal administration. In order to compare the possible effect of cream skimming on the Italian and U.S. postal administrations, we have arrayed their routes by profit margin using FY 1999 data. Again, we have adjusted the Poste Italiane revenue to breakeven in order to facilitate comparison.

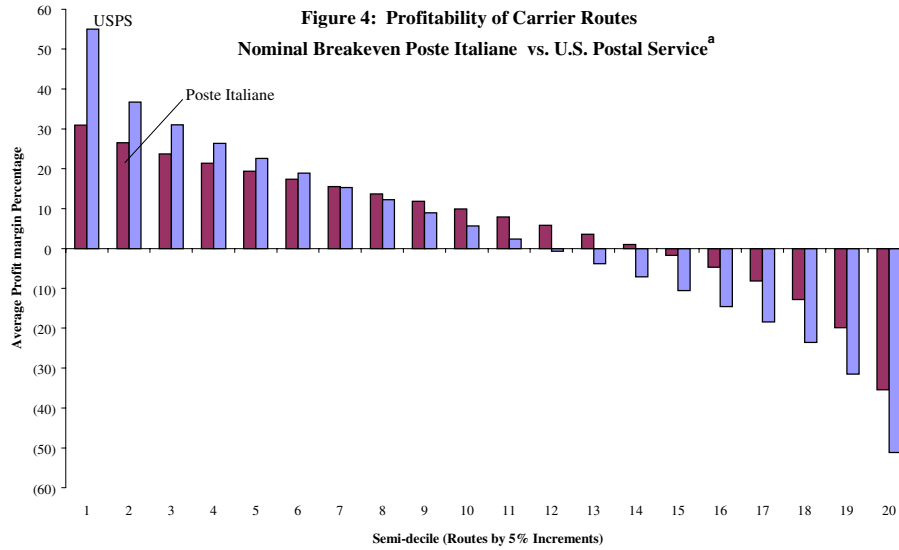
Figure 4 displays the profit margin¹⁹ of routes arrayed by semi-deciles. The most profitable Italian semi-decile has a margin of just over 30 percent while the most profitable U.S. semi-decile has a margin of over 50 percent. However, a greater percentage of Italian routes are profitable than U.S. routes.

We do not know the profit margin that would actually attract cream skimmers. If it is 30 percent, then 10 percent of U.S. routes would be vulnerable and less than 7 percent of Italian routes would be vulnerable.

Virtually all profitable routes in Italy are urban. In the U.S., only about half of the routes served by city carriers are profitable while three quarters of the routes served by rural carriers are profitable.²⁰ It may well be that competition is much more likely to develop in urban areas. If so, Poste Italiane would be at greater risk from cream skimmers than the U.S. Postal Service.

¹⁹ For purposes of this discussion, profit margin is defined as the ratio of delivery profits to route costs (i.e. upstream variable plus total delivery cost).

²⁰ In the U.S. about one fifth of the routes served by rural carriers are in high-density suburban areas.



The percent of total revenue by semi-decile is shown in Table 6. At every semi-decile except the first, Poste Italiane receives a greater percentage of total revenue than the U.S. Postal Service. This is due to the fact that a much larger percentage of U.S. revenue comes from undelivered mail.

The distribution of profitable routes shown on Figure 4 indicates that the U.S. Postal Service’s revenue (volume) per route is much more skewed than Poste Italiane’s, as measured by the relative size of the bars at the extremes. This would tend to make the U.S. Postal Service more attractive to cream skimmers than Poste Italiane (at most profit thresholds). This skewness results from mail volume being highly correlated with income and U.S. income distribution being much more skewed than Italian income distribution. (Berthelemy and Toledano 2000; Kolin and Smith 1999) In fact the U.S. has the most skewed income distribution of any industrialized country as measured by the World Bank’s Gini Index. The U.S. Gini Index is 40.8 while Italy’s is 27.3.²¹ Thus, Italy should be fairly typical of the distribution of route profit margins of industrial countries and the U.S. should be an outlier.

²¹ “World Development Indicators 2001, Table 2.8” The World Bank, Washington, DC. The unweighted average of Gini Indices for industrialized countries is 30.6. Austria has the lowest index at 23.1.

Table 6: Delivered Mail Revenue As Percent of Total Revenue

Routes by Semi-decile (Ranked by Profit)	Cumulative Percent of Total Revenue		Routes by Semi-decile (Ranked by Profit)	Cumulative Percent of Total Revenue	
	U.S.	Italy		U.S.	Italy
1	10	10	11	53	62
2	16	18	12	56	66
3	21	24	13	59	69
4	26	30	14	61	72
5	31	36	15	64	74
6	35	41	16	66	77
7	39	46	17	69	79
8	43	50	18	71	81
9	46	54	19	72	83
10	49	58	20	73	84

Because volume and revenue are highly correlated, if volume is lost to cream skimming, then revenue is also lost. Figure 4 and Table 6 can be used to estimate likely profit and revenue losses to cream skimmers and Figure 3 to estimate the cost impact of volume losses. Depending on the threshold selected, the potential impact on the respective posts can be compared.

We doubt that cream skimmers could capture even a majority of the volume on any route owing to the limited amount of contestable volume in the U.S. and perhaps other countries.²² Nevertheless, to the extent that volume would be lost to cream skimmers, the impact on Poste Italiane would be greater than on the U.S. Postal Service.

As mentioned above, the Italian data have been adjusted for breakeven. Had we not done this, very few Italian routes would be profitable. A postal service that is below breakeven will be less attractive to cream skimmers than otherwise. On the other hand, if a postal service is above breakeven, its routes will be even more profitable and hence, more attractive to cream skimmers.

6. ENTRY PRICING

The entry pricing measure defines the cost of the USO as the sum of lost profits from entry by a competitor. The form of entry that we consider is delivery cream skimming. If an entrant were more efficient than the incumbent, then the USO would not cause the lost profit. Under the restrictive definition of the USO, however, it is possible for the incumbent post to be more efficient than the entrant and still lose profits because the incumbent must charge a uniform price. The entrant would most likely attack routes with much higher than average profit margins. The incumbent would not be able to

²² Cohen et al. (2000) found that less than 16 percent of total U.S. Postal Service volume is contestable.

respond because of the restrictive USO. *Ceteris paribus*, the more skewed the incumbent's route profit margin distribution, the more vulnerable the post is to entry.²³

Figure 4 shows that the Poste Italiane profit margin distribution is much less skewed than the U.S. Postal Service's distribution. Thus, according to the entry price measure the cost of the USO is higher in the U.S. than in Italy.²⁴ This is contrary to the conclusion that we have drawn in Section 3 (i.e., that the burden of the USO is much higher for Poste Italiane than for the U.S. Postal Service).

The possibility of an equal or less efficient entrant capturing significant volume depends on the fraction of mail on profitable routes that is actually contestable. Given the huge scale economies of a universal service provider and the limited amount of contestable mail, it is very difficult for an entrant, at least in the U.S., to charge prices lower than an incumbent (Cohen et al. 1999).

7. NET AVOIDED COST

The net avoided cost measure (NAC) of the USO is the sum of the losses from unprofitable routes (Dobbs and Golay 1995; Elsenblast and Stumpf 1995). As stated earlier, the profits from delivered and non-delivered mail must equal the upstream fixed cost in a breakeven post. If the profits from the money making routes and non-delivered mail exceed the upstream fixed cost, then there must be an offset of money losing routes. This is simply an accounting identity. The more skewed the distribution of delivery route profit margins, the greater will be the losses from unprofitable routes. Figure 4 shows that the NAC would be greater for the U.S. Postal Service than for Poste Italiane (assuming adjustments for scale). Again, this is contrary to our finding in Section 3 about the relative burden of the USO.

Furthermore, we believe that the logic of the NAC measure is flawed. Suppose that a government decides to provide a subsidy to its breakeven postal service to offset losses on unprofitable routes because it wishes taxpayers and not rate payers to fund the USO. The postal service would then have a surplus. In order for the postal service to return to breakeven, prices would be reduced.²⁵ Because of the price reduction unprofitable routes would become even more unprofitable and some formerly profitable routes would become unprofitable. Because the total losses from unprofitable routes are greater than before, the government would have to increase its subsidy.

²³ For purposes of the discussion of entry pricing and net avoided cost, we ignore the impact of the percentage of non-delivered mail.

²⁴ Bradley and Colvin (2000) estimated the entry pricing cost of the USO for the United States. That estimate assumed that the entrant would capture all volume on all profitable routes. It is a worst case scenerio.

²⁵ The same logic would hold for a postal service earning any given profit (loss).

This process would continue until there is but one route not subsidized by the government and that route would be the route that initially was the most profitable one in the system. Thus, the net avoided cost measure implies the absurdity that a government must fund the entire delivery network if it wants to fund the cost of universal service.

8. CONCLUSION

We introduce and quantify the concept of the burden of the USO, which is the upward impact on unit costs that would result from competitive entry. We find that the burden on low per capita postal systems is much greater than on medium to high volume postal systems. This is contrary to results obtained when using the net avoided cost or entry pricing measures of the cost of the USO. We also find that the burden decreases as the percentage of non-delivered mail increases. The distribution of route profits is much more skewed for the U.S. Postal Service than for Poste Italiane. This would tend to make the U.S. more attractive to potential cream skimmers. On the other hand, a greater percentage of Poste Italiane revenue is generated by delivered mail, and this would cause cream skimming to have a greater impact on its unit costs.

APPENDIX

Model Definition.

The model is designed to define average unit cost as a function of volume (Q), based on the USPS cost structure for FY 1999.

$$AC = TC / (Q * P)$$

where:

$$TC = DC + NDC$$

$$DC = (V_d / Q_0) Q + F_d$$

$$NDC = (V_{nd} / Q_0) Q + [(E_v F_{nd}) / Q_0] Q + (1 - E_v) F_{nd}$$

The functions can be combined and expressed as:

$$TC = \{ [V + (E_v F_{nd})] / Q_0 \} Q + F_d + (1 - E_v) F_{nd}$$

The terms are defined as:

AC = Average Unit Cost

d = Subscript that indicates delivery component of a cost or volume

DC = Total Delivery Cost

E_v = Long-run variability of non-delivery institutional (fixed) costs.
Parametric values of 0, 0.25 and 0.5 used in analysis.

F = USPS Fixed Cost for FY 1999

nd = Subscript that indicates non-delivery component of a cost or volume

NDC = Total Non-Delivery Cost

P = 1999 U.S. Population

Q = Quantity (Volume) per capita

Q₀ = USPS Volume per capita for FY 1999

TC = Total Cost

V = USPS Variable Cost for FY 1999

Adjustments for differences between the USPS and Poste Italiane

Significant differences in the composition of mail and labor costs exist between USPS and Poste Italiane. To make the comparison of the unit cost from our model (which is based on USPS cost data) and the actual unit cost of Poste Italiane more meaningful, we apply three factors to the results of our model. The unit cost assuming 25% of institutional (fixed) costs vary with volume in the long run is calculated in the example.

1. First, the attributable (variable) cost from the model ($V/Q_0 * P = \$0.194$) is adjusted to reflect the different shape mix of mail handled by Poste Italiane. The proportions of letters (88%) and nonletters (12%) for Poste Italiane are applied to the USPS variable unit cost of each (13.46 and 26.60 cents, respectively). The weighted average unit cost that results (15.04 cents) is then divided by the actual USPS unit variable unit cost of 16.88 cents. The resulting ratio (0.891) is applied to the variable cost from the model.

Example: $0.194 * 0.891 = \$0.173$

2. Next, the resulting variable cost is adjusted to account for the savings from worksharing reflected in the USPS costs, which do not exist for Poste Italiane. The USPS variable costs in FY 1999 were 40% lower than they would have been without worksharing, (Cohen et al. 2001) so the variable cost from step one (\$0.173) is increased by that amount.

Example: $\$0.173 * 1.4 = \0.242

3. Finally, both variable and institutional costs are adjusted for labor cost differences. Since 78.6% of USPS costs are labor costs, that portion of the variable cost from step two (\$0.242) and institutional cost from the model (\$0.662) is adjusted by the ratio of Poste Italiane labor costs to those of USPS (74.7%).

Example: $[(0.786) (\$0.242 + \$0.662) (0.747)] + [(1 - 0.786) (\$0.242 + \$0.662)] = \0.724

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