AN ANALYSIS OF THE POTENTIAL FOR CREAM SKIMMING IN THE U.S. RESIDENTIAL DELIVERY MARKET

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October 1998

Published in *Emerging Competition in Postal and Delivery Systems*, edited by M.A. Crew and P.R. Kleindorfer. Boston: Kluwer Academic Publishers, 1999.

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A. Introduction

Postal administrations often claim that without a legal monopoly[1] to protect them from cream skimming, they would not be able to continue providing universal service at uniform and affordable prices. Because they serve delivery points with a range of profitability, postal administrations fear that without monopoly protection cream skimmers would capture their high profit routes, leaving them with their less profitable routes. The question is, would cream skimming divert so much volume that universal service at affordable prices becomes infeasible?

Sweden is the only industrial nation which actually has had competition in its letter mail market after abolishing its monopoly.[2] A competitor, City Mail, has served selected portions of the country but was twice forced into bankruptcy.[3] City Mail has again emerged from bankruptcy and is competing with Sweden Post. Perhaps on City Mail's third attempt, we will finally have a valid test of whether Sweden Post actually needs monopoly protection in order to provide universal service at reasonable prices. As far as the authors know, the economics of the competition between Sweden Post and its competitor has not been studied. If City Mail finally succeeds in avoiding bankruptcy, such a study might determine the reasons why Sweden Post was vulnerable to cream skimming. In addition, it might describe the impact that a viable competitor has had on the dominant provider. It should be noted that the presence of

[1] In the U.S., as in most industrial nations, the postal monopoly extends only to letter mail (including addressed advertising).
[2] Finland has abolished its monopoly and in so doing created a licensing system for competitors to Finland Post. No other operator has yet begun to offer service in competition with Finland Post. New Zealand has also just recently abolished its monopoly, but it is too early to know if competitors will emerge and be successful.
[3] A recent study found that the Swedish Postal Service had engaged in a variety of anti-competitive practices with respect to its competitor. *See* "Deregulation of the Postal Service's Market; report on the abuse by the Postal Office of Its dominant market position and on the Competition Authority's handling of the question of competition in relation to the Post Office," Professor Erik Nerep (Stockholm School of Economics), February 1995.

City Mail has already prompted Sweden Post to lower prices for large volume mailers in areas served by its competitor.[4]

Cream skimmers take advantage of an incumbent's price when it is based on an average of heterogeneous costs. They serve the low cost portion of the market and price below the incumbent. Conceptually cream skimming has two basic dimensions — product and geography. Product cream skimming is where a competitor tries to capture the most profitable portion of the market for a product with heterogeneous costs. Geographic cream skimming is where a competitor tries to provide a service only to selected, low cost areas.[5] City Mail is an example of geographic cream skimming. Its carriers provide twice weekly delivery to various areas in Sweden for large volume customers.[6] This paper addresses only geographic cream skimming.[7]

Postal monopolies, like most other legal monopolies, are thought by many observers (1) to be technically inefficient, and (2) to have delivery functions which exhibit economies of scale.[8] This paper addresses several questions which arise from these two points under the assumption that the monopoly and any other barriers to entry were to be removed. It asks how much more efficient would a potential competitor have to be to overcome the scale economies of the U.S. Postal Service? Assuming potential competitors are able to achieve the necessary level of efficiency, it then asks how much volume might they be able to capture and in which markets? Finally, it asks what effect would the loss of volume to cream skimmers have on the

[4] It would be interesting to learn: How much it cost Sweden Post to serve the areas where it lowered prices relative to its average cost, how important the abandonment of universal pricing is to Sweden Post's competitive position, and are the circumstances in Sweden applicable to the U.S.? Section J of this paper examines this issue further.

[5] Cream skimming may have a third dimension having to do with transactions costs. In practice cream skimmers may restrict themselves to large volume customers since the transaction costs of dealing with smaller volume customers and individuals may be prohibitive.

[6] Sweden Post delivers five days per week.

[7] A report by the General Accounting Office (GAO) at least partially analyzed the effect product cream skimming would have on the U.S. Postal Service. Its assessment was as follows: Priority Mail (First Class over 11 ounces) - high risk of loss of significant volumes, but a low financial impact, if it did occur; First Class - low risk of loss of significant volumes, but a high financial impact, if it did occur; Advertising Mail - low risk of loss and a medium financial impact, if it did occur. *See* "Postal Service Reform; Issues Relevant to Changing Restrictions on Private Letter Delivery," General Accounting Office, September 1996.

[8] In the U.S., legal monopolies include the local delivery of electricity, gas, water and until recently telephone.

resulting prices the Postal Service would have to charge in order to maintain universal service?

Many observers believe that cream skimmers in the United States would serve cities and leave rural areas to the universal service provider because they assume that the cost of delivery to rural areas is much higher than the cost of delivery to cities. An earlier study[9] challenged that assumption. It estimated that in 1989 city delivery cost per piece was only 8 percent lower than rural delivery, but that city delivery cost per delivery point was actually 7 percent higher than rural delivery cost. It concluded that there was no cross subsidy of rural delivery by city delivery. In theory, cream skimming of residential service could occur in either city or rural areas. This paper focuses on city delivery because of the more detailed data available on this type of delivery.

We first provide a brief description of the current competition in delivery. We then describe the data used in our analysis and the costs and profitability of the Postal Service's city residential delivery routes. We next examine the volume vulnerable to capture by potential cream skimmers. We describe characteristics of routes most likely to be profitable to competitors and provide a range of estimates for the cost of cream skimmers. After examining the consequences of successful cream skimming on Postal Service rates, we explain why cream skimming is not likely to be successful on business routes in the U.S. Finally, we provide some observations on the relevance this analysis may have for other countries.

B. Current Competition In Delivery

Competitors of the U.S. Postal Service may legally deliver only periodicals, catalogues over 24 pages, parcels, and unaddressed letters.[10] Alternative delivery is particularly difficult because of the so called mail box law which prohibits any one but the Postal Service from accessing a private mail box.[11] The U.S. Postal Service

[9] *See* Cohen, Ferguson & Xenakis, "Rural Delivery and the Universal Service Obligation: A Quantitative Investigation." Regulation and the Nature of Postal Delivery Services, Ed. Crew & Kleindorfer, Kluwer Academic Publishers, 1993.

[10] Technically, the U.S. monopoly is primarily a revenue monopoly. A third party may deliver a letter if proper postage is affixed and canceled. The monopoly also has an urgent mail exception for letters which are charged twice normal First-Class postage with a minimum of $3.00. Unlike most industrial nations, there is no exemption from the monopoly based on weight or price.

[11] As far as we know, the U.S. is the only country that has a mail box rule.

broadly interprets "letter" to include any addressed information recorded on a physical object. Thus, for example, it considers an addressed grocery store advertisement to be a letter.

In 1989, Publishers Express was founded by Time Inc., Meredith Corp., American Express Publishing, New York Times Co., Times Mirror Co., and R. R. Donnelley, among others, to provide alternative delivery.[12] In spite of its prestigious sponsorship, the company ceased operations in 1996. Many other small entrepreneurs provide alternative delivery, but they have a very small share of the market. They are scattered around the country and mostly deliver unaddressed "saturation" advertisements and small quantities of periodicals and small parcels.

The real alternative delivery system in the United States is the newspaper industry which delivers advertising preprints or inserts.[13] The Postal Service has the advantage of being able to deliver these advertisements to all addresses, while newspapers usually (but not always) deliver inserts just to their subscribers. A typical newspaper in the U.S. has less than 50 percent coverage in its service area. This puts it at a disadvantage *vis a vis* the Postal Service, which delivers to all households. Newspapers, on the other hand, have the advantage of charging lower prices. Because marginal costs are very low, a newspaper price for preprints might be as low as 5 or 6 cents per piece. The lowest rate currently charged by the Postal Service is 11.0 to 11.4 cents for saturation mail weighing up to 3.3 ounces and drop shipped at the delivery office.[14] Newspapers deliver about 86 billion inserts annually,[15] while the U.S. Postal Service delivers at least 11 billion competing items.[16]

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[12] For a more comprehensive discussion of alternative delivery in the United States, *see* the General Accounting Office Study, *n. 7*, s*upra*.

[13] Newspapers also deliver product samples.

[14] The Postal Service has an additional disadvantage because city carriers deliver only addressed advertising mail. This requires the mailer to have an address list kept in delivery sequence and to have address labels for each piece.

[15] Newspaper Association of America's WEB Site; www.naa.org/marketscope/databank/preppriyr.htm.

[16] This was the saturation and 125-piece walk sequence Enhanced Carrier Route mail volume in 1996. Many of these items are so called "marriage mail" pieces which contain several individual advertisements combined into a single piece. These individual advertisements could each be a stand-alone insert. Thus, 11 billion pieces is an extreme lower bound on the number of preprints carried by the Postal Service.

C. City Carrier Data

Each year the Postal Service conducts a City Carrier Survey (CCS) of delivered mail volume by route. Between 1993 and 1996, the Postal Service conducted the survey using a relatively small panel of about 400 routes.[17] Prior to that, the Postal Service randomly sampled a much larger cross section of its routes over the course of a year. The last set of cross sectional data filed with the Postal Rate Commission in 1989 consisted of a sample of 16,092 different routes.[18] Because of the large sample size, these data are far more useful for our analysis than the subsequent panel data.[19]

Each record in the 1989 CCS contains the date of the observation, the 5-Digit ZIP Code in which the route is located, the route type,[20] the number of pieces (by subclass and by shape) per stop, the number of possible deliveries and actual deliveries per stop, and the stop type ("single delivery residential," "multi-delivery residential," and "business-and-mixed"). Generally, data are recorded for every tenth stop on a route. The authors were able to make use of the records for 14,884 routes.[21] This analysis is based on the data set of 13,212 usable residential routes[22] and 476,953 stops.[23] About 89 percent of all city routes are residential routes. The rest are business or mixed (residential and business).

D. Postal Service Delivery Cost And Profitability

This analysis uses delivery data from 1989, but uses 1996 cost levels for wages, fringe benefits, and other associated delivery costs. Total volume grew 13.5 percent between 1989 and 1996, and the number of routes increased 7 percent. We make no attempt to adjust for these increases.

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[17] A panel survey collects data repeatedly from the same sample.

[18] There were 157 thousand city delivery routes in FY 1989. There were also 46 thousand rural routes, most of which had costs comparable to city delivery routes. *See* Cohen, Ferguson & Xenakis, *n. 9, supra*.

[19] The 1997 CCS data were not available when the analysis for this paper was conducted.

[20] Business foot, business motorized, residential foot, residential park and loop, residential curb, mixed foot, mixed park and loop, and mixed curb.

[21] The data are organized by the 26 pay periods in a year. Portions of the data from a few pay periods were not usable. Comparisons with previously published summaries indicate that the missing data did not bias our results.

[22] To a much lesser extent this analysis makes use of data from 717 business routes.

[23] Ninety-four percent (94%) of these stops are residential, while six percent (6%) are either business, or mixed business-and-residential stops. Not all stops on a residential route are residences. Some are business stops and some are mixed (business and residential).

When calculating city delivery cost, we include the entire (fixed and volume variable) in-office and out-of-office cost[24] for all city routes, plus the cost of overtime, supervision, space, and vehicles. Starting with a productive hourly rate of $25.25 for city carriers, we calculate a cost per residential delivery route of $266 per delivery day.[25] The cost we calculate can be considered to be the avoided cost or the incremental cost of the city delivery function. Alternatively, it can be considered a lower bound on the stand-alone cost of city delivery.[26]

We calculate the daily profit of residential delivery routes for the Postal Service by totaling the revenue minus collection, processing and transportation costs of the mail delivered on each route and subtracting the delivery cost of $266.

Table 1 displays a variety of mean route statistics for residential routes separated into quartiles based on their profit. As can be seen, the mean daily profit of each quartile ranges from positive $248 to negative $110. The average profit for all residential routes is $41 with 46.5 percent of the routes operating at a loss. The route cost per piece ranges from 7.6 cents to 23.5 cents, and averages 12.5 cents. Route volume ranges from 3,485 pieces to 1,131 pieces, and averages 2,128 pieces. The number of possible deliveries (which ranges from 670 to 411) is dependent on route terrain.[27] All the statistics presented are monotonic across[28] quartiles except for route type. This is because of the close relationship between cost (per piece, delivery and stop), volume (per piece, delivery and stop), and the number of deliveries (stops) on a route. With respect to route type, we see that the percentage of curb routes is greatest

[24] "In-office" refers to the in the office activity of a letter carrier (primarily sequencing mail to be delivered), "out-of-office" refers to the activity of the carrier while on the street.
[25] This is based on the city delivery carrier total cost of $33.20 per hour. This, in turn, is based on a productive hourly rate (pay, overtime pay, and benefits for hours worked) increased to account for other costs that can be associated with carriers. These other costs include systemwide labor related costs (e.g., worker's compensation, civil service retirement unfunded liability), indirect labor such as carrier supervision, vehicle costs, and space related costs (rents, fuel, utilities, custodial maintenance). The standard work day for a city carrier is eight hours.
[26] It is a lower bound because the cost includes no marketing or administrative costs which a stand-alone firm would normally incur.
[27] By "physical terrain" we mean the physical proximity of the delivery points and whether they are most advantageously served by a curb, park & loop, or foot route.
[28] A monotonic series is one whose every term is greater than (less than) or equal to the previous term.

in the most profitable quartile.[29] These routes are largely a suburban phenomenon, they reach more stops in a day and hence, have more volume. The appendix (Table A1) presents demographic characteristics related to the quartiles in Table 1.

Table 1

SELECTED AVERAGES FOR RESIDENTIAL ROUTES WHEN ROUTES ARE SORTED BY PROFIT PER ROUTE

	Profit	Cost (cents) Per (possible)			Volume	Pieces Per (possible)	
Quartile	(dollars)	Piece	Delivery	Stop	(pieces)	Delivery[a]	Stop
1	248	7.6	39.9	66.6	3,485	5.2	8.6
2	50	12.0	52.0	73.1	2,206	4.3	6.1
3	(25)	15.7	56.8	74.2	1,692	3.7	4.8
4	(110)	23.5	64.7	81.9	1,131	2.8	3.5
All Routes	41	12.5	51.7	73.6	2,128	4.1	5.9

	Deliveries		Stops		Percentages By Route Type		
Quartile	Possible	Actual	Possible	Actual	Foot	Park & Loop	Curb
1	670	612	400	386	14	56	31
2	507	460	365	348	13	62	25
3	467	408	356	330	15	69	16
4	411	332	324	278	16	75	9
All Routes	514	453	361	336	14	66	20

[a]In the paper referenced in *n. 9, supra*, pieces per possible delivery were weighed by stop and produced a slightly higher pieces per delivery. Here they are unweighted.

The revenue for 46.5 percent of the routes (all of quartile 4 and most of quartile 3) is not enough to cover the costs of the mail delivered on those routes. Thus, it might be argued that a monopoly is necessary to ensure service to those households. For several reasons, it would seem the burden of proof for this position should fall on its proponents. The routes which are unprofitable are dispersed across the country in a great number of cities. A competitive postal service that refused to serve households on unprofitable routes would impose large transaction costs on its customers to separate mail and to secure suppliers to deliver its remaining mail. Such firms would be at a considerable disadvantage to those providing universal service. Larger transaction

[29] Curb routes deliver directly from the vehicle to a curbside mail receptacle. Park and loop routes involve

networks (be they mail, packages, overnight or telephone) are more valuable to customers and providers than smaller networks. It is for sound business reasons that Federal Express and United Parcel Service provide universal delivery service. A major business asset of the U.S. Postal Service and all other national posts is that they provide service to every address in the countries they serve. Thus, there is a business incentive for any postal provider (who is not simply a cream skimmer) to offer universal service within the territories it serves.

Routes which are unprofitable when serviced six days per week would become profitable when serviced less frequently. In a competitive environment, the Postal Service could easily retain universal service, but perhaps not a universal service standard.[30] Delivery less than six days per week would certainly be preferable to abandoning delivery altogether. Of course, if the Postal Service were to simply abandon delivery to unprofitable routes, it would not have to refuse, return or destroy mail destined to these routes. Delivery firms with lower costs than the Postal Service would emerge to serve them and the Postal Service could hand off its unprofitable mail to them.[31] Under any foreseeable circumstances, universal delivery would not cease.[32]

E. Volume Available For Cream Skimmers

It is unlikely that cream skimmers would base their selection of areas to serve on the Postal Service's delivery profits. Postal Service delivery profitability depends on the revenue for *all* mail delivered, and it is not likely that cream skimmers could capture all categories of mail.

Residential cream skimmers would serve bulk mailers with sufficient volumes of mail for the areas they serve. We assume that only mail that is presorted to the carrier route level would be vulnerable to cream skimming. If a bulk mailer did not have sufficient volume to sort to the carrier route level, the transaction costs for both mailer

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parking, covering an area by foot, then parking the vehicle in a new area.

[30] It is interesting to note that United Parcel Service recently began delivery less frequently than daily to certain residential areas.

[31] Costs would be lower by dint of lower wages and/or less frequent delivery.

[32] The concept of a universal service obligation may really mean more frequent delivery than economically warranted for households living on unprofitable routes. This, of course, is in addition to providing retail services to rural communities.

and cream skimmer would be prohibitive. Of course, third parties might become intermediaries between these bulk mailers and cream skimmers. Such parties would have to engage in processing and transportation. They would in effect be a parallel postal system for bulk mailers. An analysis of separate postal systems for bulk mailers is beyond the scope of this paper.

The U.S. Postal Service requires First-Class and advertising mail to have at least ten pieces for a carrier to qualify for a carrier route discount. Publications may qualify with as few as six pieces for a carrier route. The amounts being presorted to the carrier route level in 1996 are shown in the right hand column:

	Total (billion)	Carrier Route Presort (billion)
First Class (including cards)	97.3	3.5
Publications	10.1	4.5
Advertising Mail	71.9	29.7
Other	3.4	—
Total	182.7	37.7

First-Class Mail is unzoned and receives no discount for being deposited near its destination. Most First-Class carrier route volume is prepared by utilities and may be local depending on the billing operations of the utility. For purposes of this analysis we assume that all First-Class carrier route mail is available to local cream skimmers.

Publications Mail. While only 3.2 billion pieces of the carrier route volume is entered locally or entered close enough to its destination to be available to cream skimmers, we assume that all 4.5 billion pieces are available to cream skimmers.

Advertising Mail. Eight-five (85) percent or 25.2 billion pieces of carrier route advertising mail are drop shipped or entered locally. Notwithstanding, we assume here that all carrier route advertising mail would be available to cream skimmers.

To summarize, 37.7 billion pieces of carrier route volume are potentially available to cream skimmers.[33] This represents 20.6 percent of the total volume of 182.7 billion pieces in 1996. Geographic cream skimmers would concentrate on areas with the most carrier route volume because their cost per piece would be lowest and their potential profit would be the greatest.

Table 2 displays mean daily route statistics for routes when divided into quartiles reflecting their volumes of carrier route mail. We see a wide divergence in carrier route volume among the quartiles. The range is from 1,263 pieces to 87 pieces with an average of 551. The first quartile routes have more than twice the volume of carrier route mail as the second quartile. In fact, the first quartile has more than half of all carrier route volume delivered on residential routes. Thus, the first quartile of routes are much more attractive targets for cream skimmers than the other routes. We again see a monotonic behavior of the other variables across quartiles.[34] Route profitability by quartile in Table 2 changes by a sizable amount as compared to route profitability in Table 1. Less than half the routes in quartile 1, Table 1, are also in quartile 1, Table 2. The appendix (Table A2) presents demographic characteristics related to the quartiles in Table 2.

[33] Some of this mail is delivered by rural carriers. For purpose of this analysis, we assume that rural delivery is subject to the same degree of cream skimming as city delivery. However, some carrier route mail is delivered on business routes and some is delivered via post office boxes and, thus, would not be available to cream skimmers. Consequently, 37.7 billion represents an upper bound of the volume available to cream skimmers.

[34] The only deviation from the monotonic behavior in Table 2 occurs for deliveries per route between quartiles 2 and 3.

Table 2

SELECTED AVERAGES FOR RESIDENTIAL ROUTES
WHEN ROUTES ARE SORTED BY VOLUME OF CARRIER ROUTE MAIL PER ROUTE

					Volume (pieces)			
	Profit	Cost (cents) Per (possible)			All	Carrier	Pieces Per (possible)	
Quartile	(dollars)	Piece	Delivery	Stop	Mail	Route	Delivery	Stop
1	152	8.7	45.4	68.0	3,051	1,263	5.2	7.8
2	42	12.3	54.3	74.3	2,154	570	4.4	6.0
3	3	14.6	53.3	75.5	1,819	282	3.6	5.2
4	(35)	17.8	55.1	77.1	1,490	87	3.1	4.3
All Routes	41	12.5	51.7	73.6	2,128	551	4.1	5.9

	Deliveries		Stops		Carrier Rt % of	Percentages By Route Type		
Quartile	Possible	Actual	Possible	Actual	All Mail	Foot	Park & Loop	Curb
1	584	558	391	384	41.4	10	63	28
2	489	446	358	342	26.5	13	66	20
3	499	425	352	321	15.5	16	66	18
4	482	384	344	296	5.8	18	67	14
All Routes	514	453	361	336	25.9	14	66	20

F. Estimating The Delivery Cost For Cream Skimmers

Cream skimmers undercut prices charged by an incumbent that has heterogeneous costs but averaged prices. Cream skimmers profit by selling low cost items at below the incumbents average price. Delivery cream skimmers would attempt to serve those areas where the cost to deliver carrier route pieces is the lowest (i.e., where the volume of carrier route pieces is the highest). The first quartile of routes in Table 2 would make the best targets. It is this case we examine.

In an important sense, this is an unrealistic case since quartile 1 represents 40,000 routes which are scattered over more than half the 30,000 5-Digit ZIP Code areas in the U.S. It is extremely unlikely that they constitute all the residential routes in any 5-Digit ZIP Code nor is it likely that they make up the entire suburban ring around cities. It is unrealistic for cream skimmers to serve such a fragmented market. From both an operational and marketing standpoint, cream skimmers would have to serve markets with at best a large proportion of routes in quartile 1. Their markets would

undoubtedly contain a large number of routes in the other quartiles. Notwithstanding, for analytical purposes, we assume the best possible case for cream skimmers; that they would be able to serve only routes that fall within quartile 1.

A potential competitor must decide the level of service to provide and this decision would affect the amount of volume that it could actually capture. Many magazines, newspapers, and advertisements must be delivered within a one, two or three day window. A competitor delivering only one day a week would have to forego much potential volume. On the other hand, delivery six days a week would certainly raise the cost per delivered piece and make it less likely that a cream skimmer would be viable.[35] City Mail in Sweden chose to deliver two days per week (Monday/Thursday in some areas and Tuesday/Friday in other areas).

In all probability, a cream skimmer could not prosper unless it could deliver mail at a price less than the incumbent postal administration. Its cost per delivered piece would be a function of its cost of labor and productivity. It would be expected that a cream skimmer would have a significant labor cost advantage. Its productivity would be influenced by the in-office and out-of-office technology it employed. In 1989, Postal Service carriers spent more than 40 percent of their time in-office preparing for delivery on the street. Many mailstreams must be merged and sorted into delivery sequence.[36] It is not clear what technology cream skimmers would use. Moreover, we do not know whether the personnel of a cream skimmer would be more productive on the street than U.S. Postal Service carriers. This analysis will combine these variables (labor cost, technology, in-office and out-of-office productivity) into a single efficiency parameter.

[35] In a sense, each piece of advertising mail competes with other advertising mail for the recipient's attention. If a cream skimmer could capture a large portion of the available carrier route volume, its customers might prefer more frequent delivery to minimize this type of competition.

[36] This function is rapidly being automated for letter size mail in the U.S. Delivery point barcoded mail is increasingly being sequenced on sorting machines, saving significant in-office delivery time. From 1989 to 1996, the percentage of in-office time for city carriers has declined from 41 percent to 34 percent. It is expected that this trend will continue. Unless a potential cream skimmer had enough capital to employ sequencing automation, the Postal Service might have a significant advantage in sequencing and merging letter-shaped mail. First Class is almost all letter shaped, publications are almost all flat shaped, and carrier route advertising is 43 percent letter shaped.

G. Cream Skimmers Cost Per Piece

Table 3 has four matrices, each reflecting a different percentage of available volume assumed to be captured by cream skimmers. Each matrix presents cream skimmer unit or per piece costs based on frequency of delivery and relative efficiency of the cream skimmer. We measure relative efficiency in terms of cream skimmers cost relative to the Postal Service's cost.

The shaded cell in the top matrix, 13.1 cents, is the Postal Service cost per piece for delivering only carrier route presorted mail in the least expensive quartile. This number is derived from the 8.7 cent cost of the Postal Service delivering all mail in the least expensive quartile shown in Table 2. If only the carrier route mail is delivered, the average delivered volume decreases from 3,051 to 1,263 in this quartile. The variable costs drop as the volume drops, but the fixed costs are spread over less volume which increases the fixed costs proportionately. The result is an increase in the unit costs to 13.1 cents shown in Table 3. Going down that column, the costs per piece are displayed assuming a cream skimmer had the same cost as the U.S. Postal Service, but delivers fewer days per week. The costs decrease by the amount of fixed costs in delivery. The variable cost remains the same because the volume does not change. Most other national postal administrations would have a greater percentage of fixed costs because they have fewer pieces per possible delivery.[37]

The columns display cream skimmers' costs as a function of U.S. Postal Service efficiency, expressed as a percentage of the Postal Service's delivery cost per piece. The 120 percent column displays the cream skimmer's per piece cost if its cost were 120 percent of the U.S. Postal Service.[38] The 60 percent column displays the cream skimmer's per piece cost if its cost were 60 percent of the U.S. Postal Service.

[37] *See* Cohen & Chu, "A Measure of Scale Economies for Postal Systems," Managing Change in the Postal and Delivery Industries, Ed. Crew & Kleindorfer, Kluwer Academic Publishers, 1997.

[38] This could result from either higher labor cost or lower productivity or some combination of both.

Table 3

CREAM SKIMMER'S COST PER PIECE IN CENTS AS A FUNCTION OF EFFICIENCY RELATIVE TO POSTAL SERVICE, DAYS OF DELIVERY AND PERCENT OF CARRIER ROUTE MAIL

100% OF CARRIER ROUTE VOLUME CAPTURED

Delivery Days	Cost Relative to Postal Service					
	120%	100%	80%	60%	40%	20%
6	15.7	13.1	10.4	7.8	5.2	2.6
5	13.8	11.5	9.2	6.9	4.6	2.3
4	12.0	10.0	8.0	6.0	4.0	2.0
3	10.1	8.4	6.7	5.1	3.4	1.7
2	8.3	6.9	5.5	4.1	2.8	1.4
1	6.4	5.4	4.3	3.2	2.1	1.1

75% OF CARRIER ROUTE VOLUME CAPTURED

Delivery Days	Cost Relative to Postal Service					
	120%	100%	80%	60%	40%	20%
6	19.4	16.1	12.9	9.7	6.5	3.2
5	16.9	14.1	11.3	8.4	5.6	2.8
4	14.4	12.0	9.6	7.2	4.8	2.4
3	12.0	10.0	8.0	6.0	4.0	2.0
2	9.5	7.9	6.3	4.8	3.2	1.6
1	7.0	5.9	4.7	3.5	2.3	1.2

50% OF CARRIER ROUTE VOLUME CAPTURED

Delivery Days	Cost Relative to Postal Service					
	120%	100%	80%	60%	40%	20%
6	26.7	22.3	17.8	13.4	8.9	4.5
5	23.0	19.2	15.4	11.5	7.7	3.8
4	19.4	16.1	12.9	9.7	6.5	3.2
3	15.7	13.1	10.4	7.8	5.2	2.6
2	12.0	10.0	8.0	6.0	4.0	2.0
1	8.3	6.9	5.5	4.1	2.8	1.4

25% OF CARRIER ROUTE VOLUME CAPTURED

Delivery Days	Cost Relative to Postal Service					
	120%	100%	80%	60%	40%	20%
6	48.9	40.7	32.6	24.4	16.3	8.1
5	41.5	34.6	27.7	20.8	13.8	6.9
4	34.1	28.4	22.7	17.1	11.4	5.7
3	26.7	22.3	17.8	13.4	8.9	4.5
2	19.4	16.1	12.9	9.7	6.5	3.2
1	12.0	10.0	8.0	6.0	4.0	2.0

For all mail the Postal Service city carrier cost (fixed and variable) is 12.5 cents per piece. (See Tables 1 and 2, cost per piece all routes.) This is the cost for the delivery function. Each postal product has a variable cost for mail processing, transportation and delivery. Each product also has an average incremental (avoidable) cost. In the case of advertising carrier route mail, the average incremental cost is about

7 cents.[39] If threatened by cream skimmers, the Postal Service could respond by lowering its price towards average incremental costs. If the Postal Service maintained uniform prices but had competition only in selected areas, it would sacrifice revenue in those areas without competition. These circumstances would probably call for selective discounts (with average incremental costs as a floor) to large volume mailers[40] who would otherwise become customers of cream skimmers. Thus, cream skimmers would most likely have to have costs no higher than approximately 7 cents per piece in order to compete on a cost basis alone.[41]

The Postal Service's productive hourly wage of more than $25 may make it likely that cream skimmers could obtain some cost advantage on that basis alone. We do not know how reducing the frequency of delivery would affect demand for alternative delivery. A two-day frequency could satisfy a three-day window, but would miss many delivery dates for time value publications. It should also be noted that some customers may not be willing to leave the Postal Service for a variety of reasons including the sense of security of dealing with a government agency.

If a cream skimmer were to capture only 25 percent of the available market, it would have difficulty succeeding. At that level of market penetration, its costs would have to be 40 percent of the Postal Service's at a two-day frequency in order to be below Postal Service incremental costs. With 50 percent of the average volume at a two-day frequency, a cream skimmer's costs would have to be 60 percent or less of the Postal Service's in order to remain below the Service's average incremental costs.

[39] The variable cost of carrier route advertising mail comes predominantly from the delivery function (in-office and out-of-office). The delivery function is about 50 percent variable. Thus, the variable cost of the advertising carrier route mail product can be much lower than the average (fixed and variable) cost of delivery. The average incremental cost of advertising carrier route mail is only slightly higher than the variable cost since we estimate it here to consist of variable costs plus single subclass stop costs for 1996.

[40] Except for a customer with a very high elasticity of demand, there is no reason for a monopoly to grant volume based discounts since customers have no alternative supplier. We understand this was the case with UPS, which had a virtual monopoly in surface parcel delivery in the U.S., and did not give discounts to surface parcel customers until Roadway Package Service began to target its most lucrative customers in the 1980s. UPS then began offering discounts to certain large volume customers.

[41] Some mailers currently use cream skimmers because of service considerations.

H. Consequences Of Successful Cream Skimming

Table 4 shows the required increase in the U.S. Postal Service rates based on the percentage of carrier route volume that would be captured by cream skimmers targeting mail in quartile 1, Table 2.[42] The maximum effect is an increase of about 1.2 cents in the First-Class rate (with corresponding increases in the other classes). This would be an increase of nearly 4 percent; a significant but limited effect.

Lifting the letter mail monopoly and allowing cream skimming would likely have an important impact on rate setting for the Postal Service's large volume carrier route customers, if our assumptions are correct concerning the amount of volume available for capture by cream skimmers. The maximum impact on overall postal rates is, however, likely to be limited. The negative impact on Postal Service's finances would likely be offset to a great extent by the effect of limited competition on the Postal Service's efficiency, service performance and product innovation.

Table 4

IMPACT OF CREAM SKIMMING ON POSTAL SERVICE RATES

Percent of Quartile 1 Carrier Route Volume Cream Skimmer Captures	New Average Volume Per Route (All Remaining Mail)	Increase in First-Class Rate Cents/Piece
0%	2,128	—
10%	2,097	0.1
20%	2,065	0.2
30%	2,034	0.4
40%	2,002	0.5
50%	1,971	0.6
60%	1,939	0.7
70%	1,907	0.9
80%	1,876	1.0
90%	1,844	1.1
100%	1,813	1.2

I. Comparison Of Business And Residential Routes

We do not analyze cream skimming on business routes because only 7 percent of mail volume delivered on them is carrier route as compared to 26 percent on

[42] This assumes that cream skimmers capture the same percentage of carrier route mail in the equivalent quartile of rural routes.

residential routes. This makes them unlikely candidates for cream skimming based on our analysis. We compare several statistics for city residential and business routes in Table 5.

Table 5

COSTS BY TYPE OF CITY DELIVERY ROUTE
(1996 dollars)

	Residential	Business
Average pieces per route	2128	2325
Cost per piece	0.236	0.287
Cost per delivery point	0.979	3.604
Cost per stop	1.392	4.861
Average revenue/piece	0.255	0.342
Average profit/piece	0.019	0.056

It can be seen that business routes have slightly more pieces per route with slightly higher cost per piece.[43] The cost per delivery point and stop on business routes is much higher, but the profit per piece remains higher.[44]

We are not aware of any study that has identified the reasons why business routes have a higher cost per piece and much higher cost per stop than residential routes. Several factors may contribute, including the high cost of serving each individual business in office buildings. In contrast, residential apartment houses generally have mail boxes in one central and convenient location for carriers. Other factors include the larger proportion of business mail requiring signatures and the greater difficulty of getting around in congested business areas as opposed to residential and suburban neighborhoods. Because business routes have much higher cost per delivery point, they are unlikely candidates for geographic cream skimmers

[43] Business routes get much more assistance from routers who sequence the mail in the office, thus saving in-office time for the carrier. The cost per piece and per delivery point reflects these extra costs.
[44] Profit is higher on business routes than on residential routes because of greater volumes of high profit mail, such as on Priority and Express. Cream skimming delivery networks might be developed for such mail in business areas, but are beyond the scope of this paper.

who could be expected to have far fewer pieces over which to spread the cost per delivery point.[45]

J. Some Differences Between the U.S. and Other Countries

The classification structures in industrial countries have varying degrees of efficiency (defined as adherence to cost).[46] Efficient classification discourages cream skimmers because it leaves less cream to skim. The less efficient the classification structure, the more the administration needs monopoly protection. The U.S. Postal Service's classification structure contains several score of cost based discounts and rate differentials, probably more than any other administration.[47] This should tend to make the U.S. less vulnerable to cream skimming. Moreover, the U.S. has more pieces per capita than virtually any other country. Because the delivery function has important economies of scale, *ceteris paribus*, the U.S. should have lower per piece costs than virtually every other country. This factor also makes the U.S. less vulnerable to cream skimming. In addition, the proportion of fixed cost in the delivery network is largely a function of volume per capita (per delivery). The larger the volume per capita, the larger the proportion of variable costs and the smaller the proportion of fixed costs. Since virtually every other postal administration has less volume per capita than the U.S., a larger proportion of their delivery costs are fixed relative to the U.S. A cream skimmer can reduce its fixed cost relative to an incumbent simply by reducing the number of days of delivery. Thus, a cream skimmer would obtain less cost advantage by cutting delivery frequency in the U.S. than in countries with less per capita volume. This also tends to make the U.S. less vulnerable to cream skimming than other countries.[48]

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[45] Of course, messenger services are common in central business districts, but this is for reasons of service and not cost.

[46] The most efficient classification structure would be based on costs alone and would offer worksharing discounts wherever practical. These discounts would equal the cost savings. No postal administration meets this standard nor do the authors recommend that they do.

[47] Advertising mail alone has over 60 different rate categories with rate differentials based on shape and discounts for presorting, barcoding and drop shipping.

[48] A consequence of this is that an administration which delivers five days per week, *ceteris paribus*, is a more difficult target for cream skimmers than one which delivers six days per week.

On the other hand, some factors appear to make the U.S. Postal Service more vulnerable than other postal administrations to cream skimming. Few, if any, countries have as large a proportion of carrier route volume as does the U.S. This is the mail most susceptible to diversion. In addition, few postal administrations pay their employees as large a wage premium as does the U.S. Postal Service.[49] A wage premium allows cream skimmers to obtain an efficiency/cost advantage simply by paying the prevailing wage.

[49] *See* Cohen, Chu, Ferguson & Xenakis, "A Cross Sectional Comparison and Analysis of Productivity for 21 National Postal Administrations." Managing Change in the Postal and Delivery Industries, Ed. Crew & Kleindorfer, Kluwer Academic Publishers, 1997.

APPENDIX

This paper's analysis is based on volume and delivery statistics from 13,212 residential carrier routes. These routes were extracted from the Carrier Cost Survey (CCS), conducted by the U.S. Postal Service in 1989. In addition to the volume and delivery statistics for each of the 13,212 residential routes, CCS provides the associated 5-Digit ZIP Code served by each route. A ZIP Code may be served by many routes. The data presented in this appendix are based on the demographic data for the 5-Digit ZIP Code for each route in a quartile. Thus, the demographic data for the same 5-Digit ZIP Code could be averaged into the totals for two different quartiles. This would happen if two routes from the same 5-Digit ZIP Code were in separate quartiles.

The United States Bureau of the Census has grouped the 1990 Census of Population and Housing data using 5-Digit ZIP Codes. The file (STF 3B) is available in three CDs of about 1.4 gigabytes (GBs) and contains socio-economic data for 29,467 5-Digit ZIP Codes served by the U.S. Postal Service. The Puerto Rico ZIP Codes are not included in STF 3B file.

By merging the STF 3B file with CCS data, we have obtained economic and demographic data for the ZIP Codes in which 12,876 residential routes reside. We could not obtain any socio-economic information for the ZIP Codes of 336 residential routes (most of them in Puerto Rico) because their ZIP Codes were not included in the STF 3B file.

Tables A1 through A3 provide statistics for age, household income, and education attainment for the 5-Digit ZIP Code for the 12,876 residential routes in CCS. Table A1 presents the statistics by quartile when routes are sorted by profitability. Tables A2 and A3 present the statistics by quartile and decile respectively when routes are sorted by carrier route volume. The statistics in Table A1 show that, on average, routes in the more profitable quartiles reside in ZIP Codes with higher income households and more educated adults. Likewise, the statistics in Tables A2 and A3 show that routes with high carrier route volume reside in ZIP Codes with higher levels of household income and education attainment.

Appendix

Table A1
Selective Economic and Demographic Statistics
City Carrier Routes Sorted by Profitability
(Profit and Income in Dollars)

Quartile	Average Profit	Average Age	Household Income		Educational Attainment (Persons 25 Years and Over)		
			Average	Median	High School or Less	Some College	Bachelor's Degree or More
1	248	34.9	44,855	34,362	47.3%	26.7%	26.1%
2	50	35.0	42,856	33,061	49.0%	26.3%	24.7%
3	(25)	35.0	39,493	30,419	52.2%	25.7%	22.2%
4	(110)	35.0	37,107	27,658	54.5%	24.8%	20.7%
All Routes in the Sample	41	35.0	41,174	31,206	50.6%	25.9%	23.5%

Source: The data by ZIP Code, used to calculate the economic and demographic statistics by quartile, are from 1990 Census of Population and Housing, U. S. Department of Commerce, Economic and Statistics Administration, Bureau of the Census.

Table A2
Selective Economic and Demographic Statistics
City Carrier Routes Sorted by Carrier Route Volume
(Profit and Income in Dollars)

Quartile	Average Profit	Average Age	Household Income		Educational Attainment (Persons 25 Years and Over)		
			Average	Median	High School or Less	Some College	Bachelor's Degree or More
1	152	34.7	44,769	35,475	47.4%	27.5%	25.1%
2	42	35.0	42,065	32,166	49.9%	26.3%	23.8%
3	3	35.2	40,039	30,207	51.4%	25.4%	23.2%
4	(35)	35.0	37,546	27,656	54.2%	24.2%	21.6%
All Routes in the Sample	41	35.0	41,174	31,206	50.6%	25.9%	23.5%

Source: The data by ZIP Code, used to calculate the economic and demographic statistics by quartile, are from 1990 Census of Population and Housing, U. S. Department of Commerce, Economic and Statistics Administration, Bureau of the Census.

Table A3
Selective Economic and Demographic Statistics
City Carrier Routes Sorted by Carrier Route Volume
(Profit and Income in Dollars)

Decile	Average Profit	Average Age	Household Income		Educational Attainment (Persons 25 Years and Over)		
			Average	Median	High School or Less	Some College	Bachelor's Degree or More
1	238	34.5	45,240	36,039	46.3%	28.4%	25.3%
2	108	34.8	44,590	35,416	47.8%	27.0%	25.2%
3	61	35.0	43,421	33,250	49.0%	26.7%	24.3%
4	45	34.9	42,044	32,118	50.0%	26.5%	23.5%
5	33	35.1	41,765	31,946	50.3%	25.8%	23.9%
6	10	35.3	41,239	31,208	50.6%	25.6%	23.8%
7	3	35.2	39,603	29,649	51.9%	25.1%	23.0%
8	(15)	35.0	38,678	28,556	52.4%	25.1%	22.5%
9	(21)	35.2	38,320	28,722	53.6%	24.3%	22.2%
10	(59)	34.8	36,057	26,722	55.6%	23.9%	20.5%
All Routes in the Sample	41	35.0	41,174	31,206	50.6%	25.9%	23.5%

Source: The data by ZIP Code, used to calculate the economic and demographic statistics by decile, are from 1990 Census of Population and Housing, U. S. Department of Commerce, Economic and Statistics Administration, Bureau of the Census.