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1. INTRODUCTION

This paper explores whether it would be commercially interesting for historical postal operators to price the "postal last mile". By introducing the receiver pays principle it identifies an approach which could lead to a number of innovations in service arrangements and in financing the universal service obligation (USO).

Indeed, the way the postal last mile for the delivery of lettermail[2] has been defined, serviced and priced so far has historical origins and, as yet, has seldom been called into question. Today this question is attracting increased attention, driven by three considerations: first, mail volumes appear to decline, at least in the traditional letter market, leading to diminishing scale effects. Secondly, the changing consumer behavior resulting from new information and communication technologies is reducing the pressure on speedy delivery and prompting a redefinition of what constitutes a universal postal service. Thirdly, there is a growing debate about whether or not access to the incumbent's distribution network is to be granted to competitors.

Against this background and given the cost-sensitiveness of the last mile, postal operators are increasingly seeking ways to reduce costs at the distribution end of the value chain. They typically do so by delivering more efficiently or by reducing service levels. In contrast to these approaches, we look for possibilities to give *more* value to the last mile by introducing a delivery fee that receivers would have to pay when choosing traditional home delivery. In conjunction, we discuss a new way of financing the USO.

This paper models – for the first time, to the best of our knowledge– recipient pricing in the postal sector and tests it with Swiss data. In Section 2, we briefly consider the question of the last mile in other network

[1] The views expressed in this paper are those of the authors. The authors would like to thank M. Crew and P. Kleindorfer for their helpful comments.

[2] To facilitate discussion, this paper focuses on letter mail, considering that parcels have a somewhat different last mile problem. However, the models discussed here are, in principle, also applicable to parcels delivery.

industries to get a better understanding of the last mile issue and of whether and how it differs from other sectors. In Section 3, we look at USO service levels: as mail distribution remains a universal service obligation it is necessary to explore the leeway an incumbent actually possesses when exploring new options for the postal last mile. Section 4 describes principles, conditions, and fields of application of the receiver pays principle (RPP). We also outline its future potential for service level differentiation and for financing the USO. Section 5 presents and calibrates the model by looking at its implications in terms of both operators' profit and overall welfare. We present and discuss our results in Section 6 and conclude in Section 7.

2. THE PROBLEM OF THE LAST MILE

The "last mile" is a typical concept of network industries such as telecommunications, electricity, gas, and others. The last mile became an issue mainly because of the liberalization of these industries, where the owners of the networks have given or have been forced to give access to their networks. We briefly consider the debates in the telecommunications and electricity sectors and compare them with the postal sector.

In the telecommunications sector, the last mile is defined by the physical cable that links the individual household to the dispatching central. For economic reasons, it is generally not deemed efficient to duplicate this last mile. Therefore, the European Commission and national regulators have forced the historical operators to open up their last miles to competitors, who rent the last mile at a regulated price. More recently, technological alternatives such as television cable or broadband wireless access have emerged. It is therefore being increasingly debated whether access to the historical operator's last mile should be regulated at all, or whether technological and commercial competition is sufficient to serve consumers' interests and by doing so increase welfare. Most suppliers price their services with two-part tariffs (TPT)[3]. TPT means that the consumer pays a

[3] Although the TPT principle was known long before, it attracted renewed attention with the emergence of mobile phones. In the late 1990's the UK industry regulator claimed that the prices for calling mobile phones were too high. This triggered additional research. One of the findings was that the high prices stemmed from asymmetric incentives, where the originating party paid for the totality of the call. It was suggested that if instead the receivers were to pay for some or all of the call, mobile prices would be lower (Doyle and Smith, 1998). However, this might also lead to inverse effects. For instance, Schwarz-Schilling (2001) reports that the slower growth of mobile telephony in the US compared to other parts of the world could be attributed to the receiver pays principle.

fixed plus a variable tariff. The first part of the tariff is a fixed participation fee that gives the right to make and/or to receive calls. The second part represents the actual usage of the phone line. Typically, callers are charged some fee per time unit consumed. From an economic point of view a TPT makes sense when the suppliers face a large amount of fixed costs (e.g., to set up and operate a telecommunications network). It enables the operators to charge usage fees close to marginal costs without making a loss. The special feature of the telecommunications TPT is that both the sender and the receiver have to pay the fixed fee. Therefore, we do not have a pure sender pays principle (SSP) in the TPT, because the fixed part (the connection fee) is equally distributed among the two parties. Figure 1 will later illustrate the pricing scheme in comparison with other network industries.

In the electricity sector, the discussion about the last mile is less advanced, yet, at least in the beginning of the liberalization process, very similar to the debate in the telecommunications sector. With the liberalization of energy production, local distributors remain monopolists in that they own the connection to the final consumer at the household level. Duplication of the incumbent's last mile is too expensive. Unlike in the telecommunications industry, no realistic technological alternative exists for local power distribution, which is therefore a typical example of a monopolistic bottleneck. Consequently, if consumers chose to purchase their electricity from a remote producer rather than from their local distributor, the local distributor is usually forced by the regulator to transport this electricity at a regulated access price. There exists a broad variety of pricing schemes for the final energy consumer, such as peak load pricing. Pricing schemes are mostly based on TPT and the receiver pays principle, as it is always the receiver who orders the power. Consequently, the receiver pays for both the power consumption (variable tariff) and the infrastructure needed to transport the power (fixed tariff).

In the postal sector, the concept of the last mile is used above all by analogy. Taking up this analogy, the postal last mile resembles the current situation in the telecommunications rather than the electricity sector. Although mail delivery has the properties of a natural monopoly (subadditive cost function), it can hardly be seen as a monopolistic bottleneck: the experiences of New Zealand, Sweden and the Netherlands indicate that the natural monopoly of letters delivery is contestable. To some extent this questions the rationale for the ongoing European discussions about regulated access. With emerging parallel delivery networks one can indeed expect a greater variety of pricing schemes and product differentiation. Yet, surprisingly, pricing innovations with regard to the last mile remain rare. Today, virtually all postal services apply the sender pays principle (SPP), where receivers do not have to pay anything to be connected to the postal network.

The core idea of the following sections is to explore whether, as in the telecommunications sector, advanced pricing models with TPT, RPP and SPP elements would make sense in the postal sector both from a commercial and a welfare point of view.

3. THE UNIVERSAL DELIVERY OBLIGATION

Historically, each European postal operator had its own definition and practice of the postal last mile. The EU Directive of 1997 (amended in 2002) states that the postal operator responsible for the universal postal service must deliver postal items *"to the home premises"*. However, it does not specify a series of issues, such as the exact point of delivery; it does not say anything about the exact time of delivery during the day; and it does not mention whether or not the operator may charge last mile delivery fees (e.g., subscription fees to the households or specific door delivery fees).

In other words, the European Commission allows for significant leeway when it comes to the requirements of downstream universal service, the "universal delivery obligation". A more detailed analysis of what universal delivery service means in different countries shows that, while there is significant similarity in delivery frequency, there remain differences regarding delivery point, time, and quality. Also, many countries grant exceptions to the obligation, authorized normally by the regulator or exceptionally by the political authorities. In the case of Switzerland, house delivery is the standard. Exceptions can be decided by Swiss Post, though they must be notified to the regulator.

In conclusion, we can say that the downstream universal postal service and the pricing of this service as conceived from a political perspective generally remain quite vague – i.e., defined only by *"delivery to the home premises"* – yet almost no country seems to be taking advantage of this vagueness.

4. TOWARDS DELIVERY PRICING

Despite a number of structural similarities, it is the sender pays principle (SPP)[4] that prevails in the postal sector, whereas the Receiver-Pays-Principle (RPP) or Two-Part-Tariffs (TPT) have gained widespread acceptance in other network industries. In those industries, technological advances and liberalization typically lead to new services, differentiated quality standards, and the unbundling of the value chain. We also find price differentiation

[4] The analogous term in the telecom industry is "calling party principle" CPP.

with two or multi-part tariff schemes. This reflects growing competition, as well as demand and cost considerations: suppliers make use of market segmentation strategies with customer preferences being better reflected in the variety of product-price-bundles supplied. Generally, then, the presence of competition, along with high shares of fixed costs, leads to some sort of fixed access fee and variable usage prices.

A brief, non-exhaustive look at the literature shows that a large number of variables influences the choice of an optimal pricing model. In the telecommunications industry, for instance, there are differences between situations in which either party can initiate a message exchange and those in which only one party can do so. Other influencing factors are, amongst others: number of messages sent and received which have the same value for the respective senders and receivers; receivers' knowledge of the value of the message; degree of dependency between messages sent and received; cost and cost relation between messages sent and received. Such model features have important implications for the choice of the welfare optimizing pricing model. By way of example, if an incoming message triggers an outgoing message of the same value in reply, then call externalities will be internalized in the demand for sending messages, if not, then a two-part pricing scheme might prove welfare optimizing. There are a number of papers analyzing such models. One important conclusion is that in the presence of call externalities RPP can increase both welfare and profits (Hermalin and Katz (2004)[5].

Looking at the postal industry, we know of no case where RPP is currently in widespread use. We have to go back to the pre-Rowland Hill era to find RPP as a common means of payment[6]. However, the topic has been taken up again in the recent past. Owen and Willig (1981) stated that postal rates constitute a deviation from efficient marginal cost pricing. They proposed setting up a guaranteed basic service delivery and pricing additional delivery services to the receivers according to demand. Schwarz-Schilling discusses a number of reasons, among them *"operational costs, transaction costs and the relevance of distributional goals",* for the fact that a two-part tariff (variable part SPP, fixed part RPP) *"has never been put into practice on a significant scale so far"* (2001:18). This conclusion relies on a

[5] The results are, of course, subject to a number of model assumptions not discussed here. For further references see for example Jeon, Laffont and Tirole, 2004; Kim and Lim, 2000.

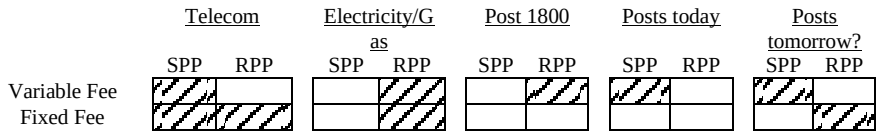
[6] For details on postal reform introducing the sender pays principle, see for example Hill and Hill, 1880. It is interesting to note that Hill proposed that a small additional charge be made either in advance or on delivery on the ground that, in some small places, the penny charge would not cover the cost of the delivery. However, he withdrew this suggestion later (Hemmeon, 1912). For a more recent discussion, see for example Crew and Kleindorfer, 1991.

set of theoretical considerations, yet the paper does not model or quantify costs or revenues.

Empirical evidence on the preference of receivers to pay for house delivery can be found in Elsenbast (1996). The author reports findings from a survey in which residents could choose between payable house delivery and free collection at a centralized P.O. box. He concluded – not surprisingly – that a majority (62%) of households preferred house delivery but – perhaps surprisingly – would, on average, also be prepared to pay for it.

Thus, there are potentially a number of welfare arguments in favor of such a "distributed two-part tariff", reflecting that both the senders and the receivers bear the costs of a piece of mail: the former paying the postage and the latter a fixed delivery fee. In Figure 1, the new pricing is illustrated in comparison with selected other pricing schemes.

Figure 1: Illustration of different pricing schemes in network industries



The four key arguments supporting such a combination of RPP and SPP in contrast to the pure SPP as it is currently applied in the postal sector, can be summarized as follows. First, a two-part tariff scheme brings prices more in line with costs. Efficient pricing requires, in principle, that prices equal marginal cost. The postal network, though not a physical one, entails both fixed and variable costs. A large part of fixed costs can be associated with the delivery. Consequently, introducing a fixed and a variable price component would allow postal rates to come closer to marginal costs and thus also to economically more efficient pricing. Secondly, each network transaction implies that the message has a value for both the sender and the receiver. Hence, both the sender and the receiver should contribute to the cost of a message. Thirdly, a receiver contribution would allow for a reduction of the sending tariffs. This, in turn, would stimulate volumes, which would positively influence economies of scale. Fourth, yet related to the third argument, a new source of financing the USO could be tapped.

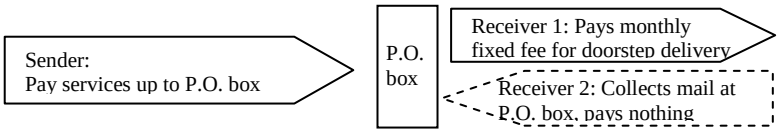
From these four arguments we derive the following pricing model. The sender pays a variable fee for the mail sent. This includes collection, sorting, and transportation to easily accessible, low-cost locations. These may be centralized P.O. boxes at the post office, but also at, for instance, the city square or the road intersection, where the mail can be picked up by the

receiver[7]. The receiver pays a fixed fee for any additional request, such as daily delivery to the doorstep[8].

The model can be used to varying degrees to cope with heterogeneity in delivery costs, which is the main cause of unsustainability of the USO in the face of entry. In other words, the model needs not to be applied to every address. Also, the model opens up a number of further options for service delivery. Receivers may wish to get their mail at the road intersection, at the house entrance, or at the doorstep, and pay differentiated prices accordingly. Moreover, once delivery is packaged and priced as a product in its own right, many additional features can be added, for instance in combination with redirecting mail, with different times of delivery, or in conjunction with electronic services. Yet, whatever model the postal operators offer to the households, it must be non-discriminatory.

In the remainder of the paper, we will focus on a stylized and simplified model as depicted in Figure 2.

Figure 2: Illustration of a stylized distributed two-part tariff



5. MODEL AND CALIBRATION

Our aim is to evaluate whether a combination of the SPP with the RPP performs better than the current SPP on its own, in terms of both operators' profits and overall welfare. We restrict ourselves to the study of the monopoly situation to reduce complexity.

Our model develops as follows. In the benchmark case, the SPP applies as it is today. Thus, the receiver does not pay for delivery. We compare this benchmark with the stylized distributed TPT as in Figure 2, which we call "*Delivery Flat Rate*" (DFR). The name *"Delivery Flat Rate"* stems from the fact that the receivers have to pay a yearly flat rate (*P*) to the postal operator if they want delivery at the doorstep. In other words, in order to receive the mail at the doorstep, the receiver has to pay *P* units of money per year.

[7] A P.O. box is not necessarily located within a post office. P.O. boxes may also consist of large units with many individual delivery boxes. These units are located at places which are easy to reach for both the post office and the recipients who come to pick up their mail.

[8] Note that receivers who are not willing to pay a "connection" fee are not cut off from the network altogether – unlike in the telecommunications sector.

Nevertheless, customers also have the option of receiving the mail for free at a P.O. box (located at a nearby post office or another centralized location).

The DFR will allow the operator to reduce delivery costs and to have additional revenues (revenues associated with the flat rate that customers have to pay if they choose to receive lettermail at the doorstep). The operator can redistribute these additional revenues to the senders by decreasing the senders' price accordingly.

If receivers are not willing to pay the delivery fee and choose P.O. box delivery instead, they incur an opportunity cost (*OC*) of going to the P.O. box to collect the incoming mail. We assume *OC* to be a function of household income *w*, the search costs *s* to realize the opportunity income, and of time *t*, needed to go from the household's doorstep to empty the P.O. box:

$$OC(w,t) = \alpha(w \cdot t)^{\beta} - s,$$

where α and β expresses the way customers value the opportunity money and time. Economic theory would state these two parameters to be 1. However, many factors are not directly covered in our opportunity function. For example, one could argue that the opportunity cost of going to the P.O. box also depends on the size of the household, on whether at least one member passes the point of centralized delivery each day, on age or health conditions of the members of the household, on whether the household receives newspapers separately from the rest of the mail, or on the number of mail pieces per day. It would be rather complex and arbitrary to introduce all these variables into our model. The two parameters α and β give us some flexibility to get an intuitive OC-distribution that corresponds to surveys made in Germany, as found in Elsenblast (1996).

The decision of the customer will depend on whether his opportunity cost of going to the P.O. box is smaller or bigger than the flat rate *P* he has to pay for delivery at the doorstep. If $OC \geq P$, then the customer will prefer to pay the flat rate and receive the mail at his doorstep. If $OC < P$, P.O. box delivery is chosen instead.

In order to analyze the welfare effects of the new DFR policy, we need to specify utility functions for senders and receivers, and a profit function for the postal service. For the sender side we follow De Donder et. al. (2001) and assume a representative sender with quasilinear preferences with respect to money:

$$U^{S}(q,\varpi) = aq - \frac{b}{2}q^{2} + \varpi - pq,$$

where q represents the quantity of mail sent, p is the price per piece of mail the sender has to pay, and ω is the initial endowment of the customer. a, $b > 0$ determine the market size and the slope of the demand curve. $\varpi - pq$ reflects the amount of money the consumer spends on all other goods. The corresponding demand function of the representative sender is as follows,

$$q(p) = \frac{1}{b}(a - p).$$

For the receiving households $i \in 1 \ldots I$ we assume a constant individual utility V_i of being connected to the postal network. Thus, their (quasilinear) utility in the monopoly case is V_i. In the DFR case, they are worse off because delivery is costly now. Thus, in order to receive mail at the doorstep, the receivers need to pay the delivery flat rate P. If they choose the P.O. box instead, their cost is OC_i. Total receivers' utility can be written as

$$U^R(P) = \sum_i \left(V_i - \min(P, OC_i)\right). \qquad (1)$$

Expression (1) offers an explanation why, so far, no postal operator has chosen DFR. If V_i is smaller than the cost of receiving mail, one would expect this person not to empty the P.O. box at all. We do not implement this possibility in our model by assuming that V_i is sufficiently large. Thus, everybody will be motivated to empty their mail box, and no network externalities are lost.

The postal service's costs are composed of both variable and fixed components, reflecting the existence of economies of scale in the mail processing. The profit function of the postal operator accordingly looks as follows:

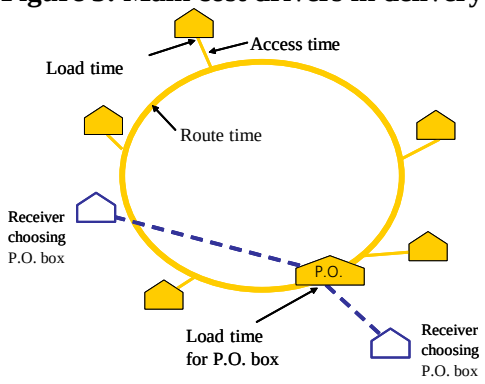
$$\pi(\hat{p}, P) = (\hat{p} - c)q - F_u - F_d \underbrace{- F_{PO}(N - n(P)) + P \cdot n(P) + AC(P)}_{\text{Additional terms for DFR}}.$$

Parameter c denotes the variable costs per mail item, and F_u and F_d are the upstream and downstream fixed costs. F_{PO} are the operator's fixed costs for providing and billing an additional P.O. box. N is the total number of households in the economy, and $n(P)$ is the number of households who choose delivery at the doorstep as a function of the flat rate P. Consequently, N-$n(P)$ represents the number of households abandoning home delivery because the flat rate exceeds their opportunity costs for a self-service at the

centralized point of delivery. $AC(P)$ are the avoided costs as a function of the flat rate P. In the benchmark case, P is zero and $AC(P) = 0$. If the flat rate was set to plus infinity in the DFR case, nobody would choose doorstep delivery and $AC(P) = F_d$. We assume that the postal operator redistributes all earnings and savings which are associated with the new policy to the senders by lowering the stamp price from p_0 to $\hat{p}$ according to the rule $\hat{p} = p_0 - \frac{P \cdot n(P) - F_{PO}(N - n(P)) + AC(P)}{q_0}$, where q_0 is the mail volume of the previous period.

Figure 3 provides additional intuition for the underlying cost assumptions. Following Cohen and Chu (1997), delivery costs can be split into three parts, i.e., "*route costs*", "*access costs*", and "*load costs*". Load costs are the costs of inserting the mail into the mailbox once the mail carrier reaches the mailbox. The profit function implies that we assume the load cost of a P.O. and mail box to be the same. These costs are included in c. Thus, only route and access cost are avoided when consumers switch to P.O. boxes. The total of route and access costs represent F_d.

Figure 3: Main cost drivers in delivery



In order to compute overall welfare in the economy, we simply add up consumers' net utility and operator's profit. For DFR, we can find the consumers' net utility by subtracting the revenues associated with the flat rate and the total disutility of going to the P.O. box from the senders' surplus.

With this framework, we will have a positive mail volume impact for any negative value of price elasticity as long as $F_{PO}(N - n) < AC + nP$. This is because we assume that the postal operator redistributes earnings and savings entirely to the senders by lowering the stamp price p. With negative price elasticity, this leads to an increase in mail demand. Whether this

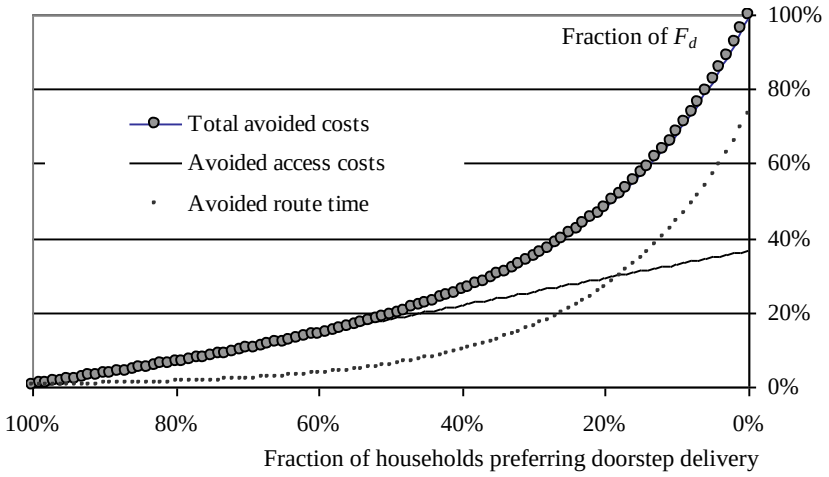
translates into greater overall welfare depends on the avoided cost function and the switching behavior of the consumers, as determined by the distribution of *OC* in the population.

In order to assess the impact on welfare, we calibrate the model using Swiss data. Swiss Post stated in its annual report that approximately 2.86 billion pieces of addressed mail were delivered in 2004. Recent Swiss Post data suggest that overall price elasticity is approximately -0.3. Parameters *a* and *b* can be directly computed using prices, quantities and price elasticities of 2004. The expression for price elasticity is as follows

$$\varepsilon = -\frac{1}{b}\frac{p}{q}.$$

On the production side, we assume the same calibration as set out in Dietl et al. (2005). We estimate the operator's yearly outlay for a P.O. box (F_{PO}) to be CHF 35. A crucial point is the avoided cost function. The function reflects how delivery costs depend on the fraction of consumers choosing P.O. boxes instead of mailboxes. We assume a function of the following kind:

Graph 1: Avoided cost function



Total avoided costs break down into the two parts "avoided access costs" and "avoided route costs" (see Figure 3). When a consumer switches to P.O. box delivery, the postal operator saves the access costs directly. These costs are related to the time the carrier saves with regard to reaching the consumer's mailbox from the prevailing route. This component is a linear function. The second component is the reduced route time, also called route

costs. Route time decreases when a sufficient fraction of households switches to P.O. boxes and delivery routes can be optimized accordingly. We assume an exponential run of this curve.

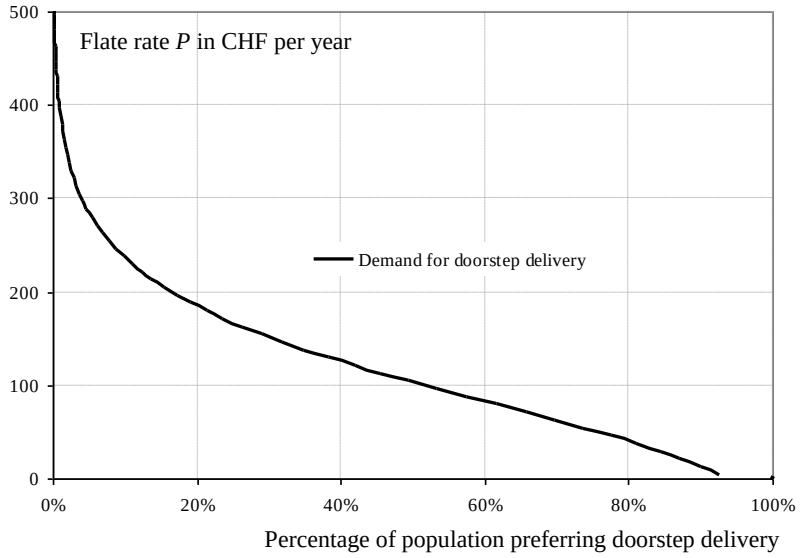
In order to compute the distribution of opportunity costs, we have generated a random sample of 10,000 observations for each of the variables *w* and *t*. We assumed the households' income and distance from the P.O. box to be independent and to follow the lognormal distribution with the following means and standard deviations[9]:

Table 1: Mean and standard deviation of *w* and *t*

	Mean	Std deviation
w (CHF)	8.933	3.507
t (minutes)	8.78	2.48

Moreover, we assumed s = CHF 150, α = 1 and β to be 0.7. Graph 2 depicts the resulting demand function for doorstep delivery.

Graph 2: Demand for doorstep delivery



[9] Data supplied by the Swiss Federal Statistical Office and by Swiss Post.

6. RESULTS

It is a straightforward task to analyze the benchmark situation, i.e., the first stage before the introduction of the flat rate for doorstep delivery. The uniform price charged by Swiss Post was CHF 0.74 on average. The model yields a profit of CHF 196 million, a consumer surplus of approximately CHF 3.4 billion. and total welfare of about CHF 3.6 billion.

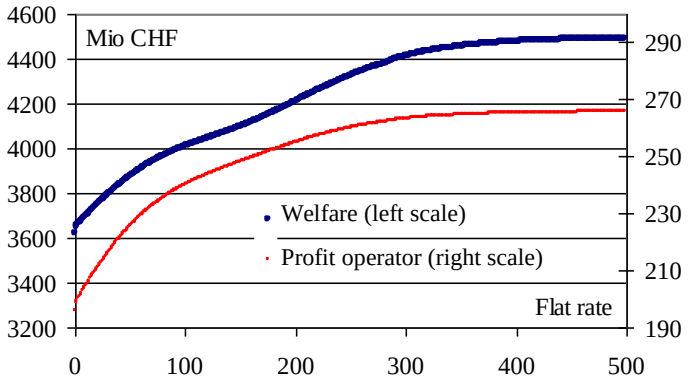
If the new policy of delivery were introduced with a delivery flat rate of CHF 100 per year, without taking into account the costs of centralized delivery boxes for the operator (F_{PO}=0) and assuming that the postal operator applied an extensive redistribution of savings and earnings, the average price would drop by CHF 0.09 to CHF 0.65. Reduced prices would cause growing demand and accordingly increase operators' profit by CHF 44 million. Simultaneously consumer welfare would increase by 10% and total welfare by approximately 11%. Table 2 summarizes the results.

Table 2: Results for different flat rates, F_{PO} = 0

	Before flat rate	After flat rate (CHF)				
		40	**70**	**100**	**130**	**160**
Demand for doorstep delivery (%)	100	82	68	53	40	28
Average price (CHF)	0.74	0.69	0.67	0.65	0.63	0.62
Quantity (million letters)	2782	2837	2867	2889	2905	2920
Consumers' surplus (CHF million)	3423	3614	3707	3769	3816	3867
Profit operator (CHF million)	196	221	233	240	245	250
Total welfare (CHF million)	3619	3835	3940	4009	4061	4117
Welfare change (in %)		6.0	8.9	10.8	12.2	13.7

In the Graph 3, we can observe how consumer welfare and operator's profit evolve for different values of the flat rate.

Graph 3: Impact of the flat rate on welfare and profit



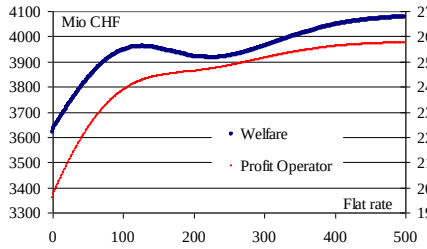
Assuming a flat rate of CHF 100 per year, we can see that irrespective of parameter α we will observe an increase in total welfare with the introduction of the flat rate (Table 3). All the remaining results are robust with regards to changes in α.

Table 3: Sensitivity analysis for α

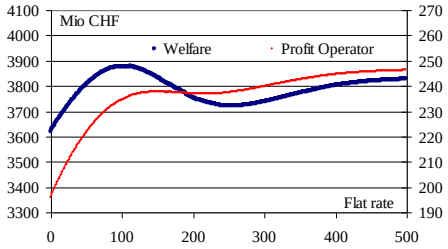
	Before flat rate	Flat rate = CHF 100 per year				
		α				
		0.8	**0.9**	**1**	**1.1**	**1.2**
Demand for doorstep delivery (%)	100	28	41	53	65	74
Average price (CHF)	0.74	0.64	0.65	0.65	0.64	0.64
Quantity (million letters)	2782	2899	2889	2889	2892	2896
Consumers' surplus (CHF million)	3423	3893	3802	3769	3764	3770
Profit operator (CHF million)	196	243	240	240	241	242
Total welfare (CHF million)	3619	4136	4042	4009	4005	4012
Welfare change (in %)		14.3	11.7	10.8	10.7	10.9

So far, we have assumed that the provision of P.O. boxes was costless for the operator (F_{PO} = 0). Because of the redistribution of additional earnings and savings to the senders, this resulted in higher welfare whenever the flat rate was increased. In other words, there is no economic reason for doorstep delivery with this calibration of the model. Graphs 4 and 5 show, however, how the results change if we take into account that the postal operator incurs the costs of building/providing an increasing number of P.O. boxes.

Graph 4: F_{PO} = 35, α = 1,2



Graph 5: F_{PO} = 70, α = 1,2



We now have a local maximum in overall welfare. This represents the point where an increase in the flat rate causes too many receivers to switch to P.O. box delivery. For about F_{PO} > CHF 50, the local maximum exceeds the border solution. In this case, the local maximum would equal the welfare maximizing delivery flat rate. To the right of the local maximum, exponential savings in route cost (cf. Graph 1) cause a local minimum.

However, the results should be treated with caution. One reason is the calibration of the demand function in Graph 2, which is more optimistic than the results from Elsenbast (1996) indicate. If one is thinking seriously about introducing a flat rate in Switzerland, the demand function should be derived empirically and matched with the corresponding demand parameters. Furthermore, the availability of P.O. boxes is probably not a linearly increasing function as implicitly assumed with the fixed provision cost per P.O. box.

7. CONCLUSIONS

Our purpose was to investigate and discuss a paradigm change in the postal value chain. We considered the question as to whom the bill for the service of the last mile should be presented, and explored the impact of combining the "Receiver Pays Principle" (RPP) with the traditional "Sender Pays Principle" (SPP) on welfare.

Our analysis leads us to the conclusion that a combination of RPP with SPP in the form of a modified two-part tariff increases overall welfare, in particular when the additional earnings and savings are redistributed to the senders. We predict an increase in mail demand, which is due to a decrease in the average stamp price stemming from the redistribution of the flat rate to the senders. Our results are based on the calibration of the demand for doorstep delivery and on the fact that we assumed a linearly increasing function for the availability of P.O. boxes. Accordingly, it is crucial to learn more about customers' perceived values and their buying patterns regarding last mile service options. Also, the implications of the introduction of RPP in a competitive environment must be further investigated.

However, the model opens the doors for mass customization in the last mile of the postal value chain. It is a starting point for seeing the recipient as a customer. Service bundles could be gradually and flexibly tailored and priced to recipients' needs. Incentives and decision making for service levels in the last mile would ultimately be transferred to those who expect and appreciate good services. Furthermore, the model provides a new and promising option for financing the universal service obligation – or, more precisely, the universal delivery obligation – of postal operators without abandoning the principle of solidarity between regions. Finally, RPP could be a suitable means of escaping from the dreaded "graveyard spiral" when it comes to a decline of mail demand. Thus, RPP could help tackling the challenges that postal operators will increasingly face in the future.

A number of questions remain unanswered, though. We hope to see postal experts launching supplementary surveys in order to help understand whether the model is indeed a viable solution for postal markets.

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