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Mail Composition and Recipients' Reaction to Direct Mail

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1 Introduction

Letter mail services have come under pressure from the emergence of electronic communication channels. The development of mail prices and its volumes shows that various types of mail evolve quite differently. So far, transactional mail has suffered more from electronic substitution than direct mail. Competition has also evolved differently in the various segments of mail: new postal operators often focus on bulk mail while transactional mail originating from households remains mostly uncontested.

Postal operators (POs) and regulators reconsider their pricing and policy based on the value of mail with electronic competition. Several studies have examined demand for mail and its drivers, most of them from the perspective of senders of mail. However, in order to understand fully the value of mail and its demand it is not only important to consider the sender's but also the recipients' preferences and appreciation of mail because the latter also determine the mail's value for the senders. The recipients' perception of the mail they receive depends on the composition or the mix of mail (further on referred to as "mailmix"): various types of mail interact with each other. Some types of mail are perceived positively and contribute to the attractiveness of the mail channel, thereby increasing the value of other mail. Other types tend to annoy the recipients and degrade the quality of the channel as a means of communication. As a side effect, in many countries "do not mail lists" have emerged. Hence, the mail stream can be interpreted as a platform with multiple market sides: senders of various types of mail and recipients.

To our knowledge, there is no empirical research available on this important topic. This paper is hence a first attempt using data from a recent survey in Switzerland. The paper examines the relevance of interdependencies between various types of mail in analogy to other platform markets. It then empirically analyzes the interdependencies of various mail types based on a Swiss data set of 2016. It shows that a balanced mailmix increases the probability of the recipient reacting positively to addressed advertisement significantly. For example, a higher share of non-advertisement mail in the recipients' mailbox

increases response rates to direct advertisement, thereby increasing the advertisers' willingness to pay for postal services. If so, postal services with a high share of advertisement mail might, in particular if they are not restricted by direct competition from competing deliverers, aim to reflect externalities between different mail types in their pricing. More explicitly, such postal services might want to increase the price of advertising mail and decrease the price of mail pieces that recipients like to receive in their mailbox.

The remainder of the paper is structured as follows. Section 2 discusses the related literature. In Section 3 the analytical framework is developed. Section 4 presents the empirical analysis and results. Section 5 concludes.

2 Related literature

There is no empirical research yet on the effect of the mailmix on the recipients' attention and the value of the mail channel for advertisers. For other platforms, e.g. newspapers and TV channels, the interaction between the various types of content and their role in the competition for readers and viewers has been studied extensively.

A platform serves two or multiple distinct groups of agents, where the utilities of the agents in one group depend on the presence of the others. A particularly interesting case is asymmetric interaction of the utilities between the groups on the platform, i.e. one group exerts a negative effect on the other group, while the latter exerts a positive effect on the former. This dissimilar interaction between the groups' utilities complicates the profit-maximizing price setting for the platform provider. A literature on such platforms and two-sided markets has emerged with Rochet and Tirole (2003), Armstrong (2006), as well as Rochet and Tirole (2006) as notable starting points. A standard example for platforms with asymmetric external effects is the media sector, i.e. newspapers, radio, and television channels, where one group consists of the consumers of editorial content and the other group by advertising. The economics of media platforms have been studied extensively. Common to all models is the division of the platform's users in two sides, advertising firms and content consumers. For instance, Anderson and

Gabszewicz (2006) model the media sector as a two-sided market in which they take into account the influence of advertising on media usage. The model is applied in the specific context of television by Anderson and Coate (2005). Furthermore, Gode et al. (2009), Crampes et al. (2009), as well as Reisinger (2012) investigate the competition between media companies using a platform model, which also integrates external effects of advertising on the media content consumers. Peitz and Valletti (2008) consider different platform designs for television with subscription fees and for free and compare the resulting advertising intensity and content differentiation. Advertising is both theoretically and empirically found to exert negative externalities on media content consumers, see e.g. Gabszewicz et al. (2004) and Wilbur (2008).

This paper builds on the theoretical framework provided in Jaag and Bach (2016) who model the mail stream as a platform carrying two types of mail (transactional and direct mail) while three groups interact on it: recipients of mail, senders of transactional mail, and advertisers, i.e. senders of direct mail. Both types of senders are interested in the recipients' attention to their items. In particular, the attention for direct mail is affected by the mailmix the recipient receives in his letterbox. Jaag and Bach (2016) conjecture that transactional mail exerts a positive effect on the recipient's attention to his mail. Consequently, the demand for transactional mail and the demand for direct mail are interdependent: Direct mail receives more attention by recipients who receive more transactional mail.

Apart from Jaag and Bach (2016), the postal sector has so far not been studied from a two-sided market perspective in which there is an interdependency between different types of mail. Jaag and Trinkner (2008) model the mail market as a two-sided market, too, but they consider senders and recipients as the two sides of the market. They argue that the subsidization of recipients by senders through the sender-pays-principle is a natural outcome of the two-sidedness of the market. Boldron et al. (2009) make an analogous distinction. They show in a two-sided market model with network externalities that the benefits of senders (per addressee) increase in the size of the high quality delivery network and that such externalities should be considered in the pricing of postal services. Rohr et al. (2011) conclude in their empirical study based on discrete choice experiments that senders do care about the attributes of the postal platform pro-

vided on the recipient side, and that the services offered on the sender side are important to recipients. The present paper is also somewhat related to Bradley et al. (2015) who analyze the demand for saturation advertising mail and targeting advertising mail in competition for the recipients' attention. De Donder et al. (2011) study welfare and pricing for bulk mail which comprises two distinct markets, of transactional and advertising mail, for which the price elasticities are different but the cost of providing those services is the same. However, they assume that demands in these markets are independent of each other.

3 The mail stream as a platform

A comparison of the mail stream as a platform to the standard examples from the media sector shows that there are significant similarities. Most importantly, all platforms face advertisers on a first market side, directing advertising to the consumers, and consumers of content mail and editorial content on a second side of the market. Consumers and advertisers are thus two distinct groups on the platform. The most apparent analogies between the television, print media, and mail platforms are presented in Figure 1.

***Figure 1**: Analogies between television, newspaper and postal mail platforms*

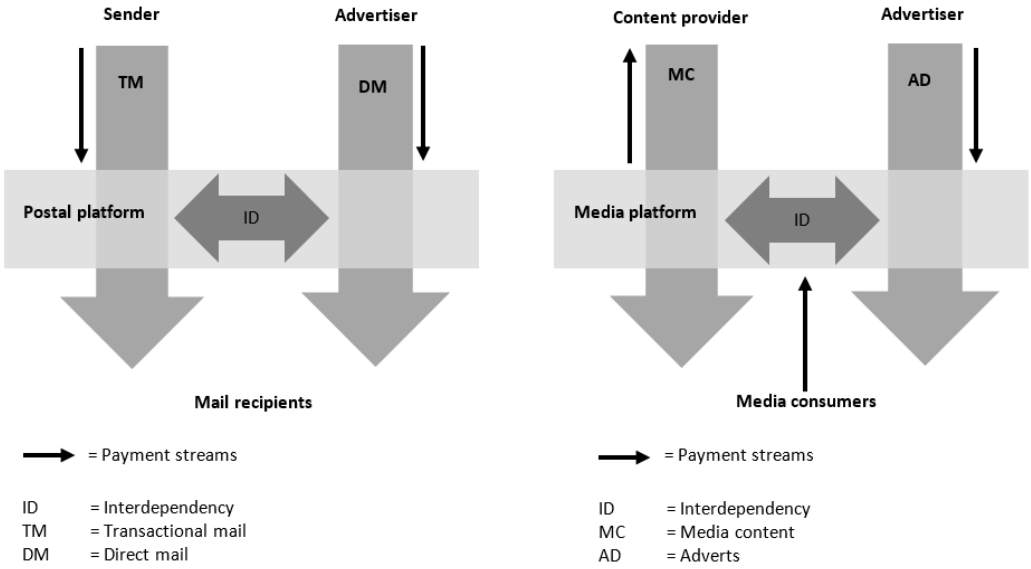
		Television	**Print Media**	**Mail**
		Channel	**Newspaper**	**Mail stream / Mailbox**
Market side1: Marketers	**Demand side**	Advertisers	Advertisers	Senders
	Good	Time slot	Page space	Various mail types
	Price	Price per advert	Price per advert	Postage fee
Market side 2: Consumers	**Demand side**	Viewers	Readers	Recipients
	Good	Televised content	Editorial content	Various mail types
	Price	Subscription or zero fee	Subscription or zero fee	Zero fee

Source: Jaag and Bach (2016)

There are also important differences between the mail stream and media platforms. In the case of the postal mail platform, there are various sender groups in the first

market: senders of various mail types, e.g. transactional and direct mail. Furthermore, while senders pay a postage fee to the platform provider, the recipients are not charged any price for the use of the mail stream platform. Media platforms may be free for content consumers, but in many cases they charge a subscription or a price per unit. Naturally, the question arises whether such differences have an effect on the optimal pricing strategy of POs to the two groups of senders. In fact, the media sector can also be modelled with three groups: Consumers, advertisers and content providers. The structure of the postal platform and the media platform with three customer groups are illustrated in Figure 2.

***Figure 2**: Illustration of the structure of the mail stream and media platforms.*



Source: Jaag and Bach (2016)

Platforms like newspapers and television channels subsidize their editorial content in order to make their platform attractive both for their audience and advertisers. In the case of the postal mail platform, senders in one market can be grouped in two categories: senders of transactional mail and senders of direct mail. Both sender types typically pay a postage fee to the platform provider. Direct mail is usually less expensive than transactional mail, which reflects differences in their direct cost and the competitive environments. Jaag and Bach (2016) argue that it would be beneficial for POs to take into account the positive effect of transactional mail on direct mail reducing the price of the former and thereby increasing the attractiveness of the mail stream as a plat-

form. They show that an improvement of the mailmix by adjusting prices for transactional and advertisement mail in favor of transactional mail is well possible for a monopolistic PO who can thereby fully internalize the interdependency between the mail categories. However, these efforts are thwarted by the decrease of transactional mail due to electronic substitution, which has a long-term adverse indirect effect on direct mail through the degradation of the mailmix. With open postal markets, entrant POs typically focus on bulk and direct mail. Hence, they can freeride on the mailmix provided by the incumbent PO. This reduces the incumbent's incentives to cross-subsidize transactional mail in an effort to make the mail stream an attractive platform for advertising. Hence, besides the adverse effect of electronic substitution, the mailmix also tends to degrade as a result of postal market opening which might indirectly contribute to the substitution of direct mail, too. These considerations, as developed in Jaag and Bach (2016), strongly rely on the assumption that there is indeed an interdependency between various types of mail, i.e. that senders care about the recipient's mailmix. This is certainly the case if the recipients' reaction to their mail depends on their mailmix, too. This assumption will be empirically explored in the following section.

4 Empirical effect of the mailmix on the recipients' reaction to direct mail

In this Section, the effect of the mailmix (consisting of various types of mail) on recipients' behavior is estimated based on a Swiss panel data set of 2016. First, the available data is described and various types of mailmix proxies are derived. Second, the estimation model and third the results are presented.

4.1 Data set and mailmix proxies

Over the course of a week in March 2016, a random sample of Swiss recipients were asked daily how many items of different types of mail they received and how they reacted to the direct (advertisement) mail they received. The data set consists of a panel of

11,198 observations (mail items) received by 544 recipients. From the 11,198 mail items, 4,622 were addressed letters, 3,409 newspapers and 2,836 unaddressed items. For every mail item, the recipients reported the type of mail (see Table 1), and what they did with it. For advertising mail, recipients could choose among a series of possible alternatives (for more details cf. next subsection). Some observations contain missing information, especially observations regarding the reaction to addressed advertisement. All observations contained in the sample result from recipients that opened their mailbox. More concretely, all recipients emptied their mailbox daily, which may be an effect of participating in the survey.

Table 1: *Assignment of mail types to mailmix proxies.*

	Category in data base	**Mailmix 1: Share of non-advertisement**	**Mailmix 2: Share of private mail**	**Mailmix 3: Share of "good" mail**
1	Bill/admonition/credit card statement	X		
2	Advertising mail			
3	Catalog			
4	Notification/contingent	X		
5	Bank statement	X		
6	Appeal for funds			
7	Forms/documents (e.g. for voting or tax)	X		
8	Customer magazine	X		
9	Invitation/reply to invitations	X	X	X
10	Spontaneous writing	X	X	X
11	Mail of clubs or associations	X	X	X
12	Periodic regular mail contact	X	X	X
13	Replies to requests/applications	X	X	X
14	Payrolls	X		X
15	Offers/quotes	X		X
16	Gifts/vouchers			X
17	Greeting cards	X	X	X
18	Picture postcards/holiday greetings	X	X	X
19	Public holiday/season's greetings	X	X	X
20	Announcement of special events (e.g. marriage etc.)	X	X	X
21	Confirmation (e.g. of course enrolment)	X		X
22	Competitions/lotteries etc.			
23	Forwarding of forgotten items	X	X	X
24	Condolences	X	X	X

In order to investigate the interdependencies between various types of mail items, three mailmix proxies are defined according to equations (1) to (3).

$$\text{Mailmix 1} = \frac{\text{Non-advertisement mail}}{\text{Total mail}} \quad (1)$$

$$\text{Mailmix 2} = \frac{\text{Private mail}}{\text{Total mail}} \quad (2)$$

$$\text{Mailmix 3} = \frac{\text{Good mail}}{\text{Total mail}} \quad (3)$$

Table 1 summarizes the different mail categories and how they are assigned to three chosen mailmix proxies. Mailmix 1 represents the share of non-advertisement mail items. Mailmix 2 represents the share of private mail received, i.e. mail items sent by private senders. This category excludes mail sent by businesses as well as advertisement. Mailmix 3, share of "good mail", is the share of mail items that are expected to be perceived positively by recipients based on the authors' assessment. Besides all private mail categories in the enumerator of Mailmix 2, the enumerator of Mailmix 3 also contains offers/quotes, payrolls, gifts, and confirmations .

The descriptive statistics of the mailmix proxies are given in Table 2. The table reveals that the share of received non-advertisement items per recipient in the sample is about 50% on average over the entire week, and the share of private and good mail is 13 and 18%, respectively. The entry for "mailmix 2 – daily" represents the averages per day (not per week), with a corresponding higher standard deviation.

Table 2 provides descriptive statistics of selected further variables, such as age, gender, whether the recipient receives also unaddressed letters (in Switzerland, about 50% of households have their mailboxes tagged with "no advertisement", hence not receiving unaddressed mail), and whether the recipient received newspapers in the respective week / on the respective day (for daily mailmix definitions).

Table 2: *Descriptive statistics of the variables.*

	Mean	**Std.dev.**	**Min.**	**Max.**
Mailmix 1 – Overall	0.495	0.244	0	1
Mailmix 2 – Overall	0.125	0.143	0	1
Mailmix 3 – Overall	0.182	0.168	0	1
Mailmix 2 – Daily	0.125	0.242	0	1
Age category fixed effect	2.849	0.993	1	4
Gender (1 = female)	0.562	0.496	0	1
No ads sticker fixed effect	0.538	0.499	0	1
Also received newspaper fixed effect	0.945	0.229	0	1

The age categories are defined as follows: category one contains all observations with an age ≤ 30. Category two all with 30 < age ≤45. Category three all with 45 < age ≤ 60. Category four all with age > 60.

4.2 Model

The effect of different mailmixes on the reaction of recipient *i* to addressed advertisement mail is estimated by means of an unordered multinomial logit model. It is differentiated between the three reactions *R* of type *j* which are “positive”, “neutral”, and “negative”. A reaction to addressed advertisement is considered to be positive if the recipient asked for products or services of the sender, contacted the sender, or searched in the Internet for further information. A reaction is considered to be neutral if the recipient put the mail aside for later action or for other behavior. A reaction is considered to be negative if the recipient discarded the mail immediately. The probability for one of the three reactions *j* is given in eq. (4) and depends on several covariates $\mathbf{x}_i$, e.g. age and gender of the recipient or the mailmix. The disturbances are assumed to take on an i.i.d. logit distribution. The log-odd ratios of a positive or negative reaction against the base case of a neutral reaction *n* then can be given as shown in eq. (5) with the intercept being set to zero. The coefficients of vector $\boldsymbol{\beta}$ are obtained by maximum likelihood technique (Greene, 2002).

$$\text{Prob}(R_i = j \mid \mathbf{x}_i) \equiv P_{ij} = \frac{e^{\boldsymbol{\beta}_j^T \mathbf{x}_i}}{1 + \sum_{s=1}^{3} e^{\boldsymbol{\beta}_s^T \mathbf{x}_i}}, \quad j = 0,1,2 \tag{4}$$

$$\ln\left(\frac{P_{ij}}{P_{in}}\right) = \mathbf{x}_i^T \beta_j \tag{5}$$

4.3 Results

Based on the data described above, the recipients' behavior is analyzed in terms of the reaction to addressed advertisement conditional on mailmix characteristics. Table 3 summarizes the benchmark results of the corresponding multinomial logit models for the effect of different mailmixes on the reaction to addressed advertisement against the base outcome of a neutral reaction (put aside). The upper part shows the complete regression results using the mailmix 2 proxy including a fixed effect of whether or not the recipient also received newspapers. The middle part only presents the estimated coefficient of the mailmix proxy with the models including the same coefficients as shown in the upper part, except the fixed effect of also having received newspapers during the period observed. The lower part presents the estimated coefficient of the mailmix 2 proxy evaluated daily rather than weekly.

All mailmix proxies are highly significant and positive, indicating that a good mailmix increases positive reactions towards addressed mail. For the control variables, age has no effect on the reaction pattern. Females and newspaper subscriber appear to react less positively to addressed advertisement. Interestingly, "no ads" stickers affect the reaction towards addressed advertisement positively. Postal services are not allowed to deliver unaddressed advertisement to mailboxes with this sticker. Hence, this effect may be related to an increase in attention time for addressed advertisement, assumed that total attention time is constant for addressed and unaddressed mail. Table 4 probes these results with respect to the number of mail items received by the recipient to certify our benchmark results not being primarily driven by the number of total mail items re-

ceived. The results obtained suggest that the benchmark results are robust in terms of the inclusion of total mail as explanatory variable. The magnitude of the estimates as well as their significance hardly changes. Other covariates still are in the range of the benchmark specification in terms of magnitude and significance.

Table 3: *Effect of mailmix proxies on the reaction to addressed advertisement [M1].*

Multinomial logit model	**Positive reaction**		
Basis: neutral reaction	**Odds ratio**		**Std.dev.**
[M1-1] Mailmix 2 – Overall	2.763	**	(1.100)
30 < Age ≤ 45	0.421		(0.567)
45 < Age ≤ 60	– 0.344		(0.591)
Age > 60	0.073		(0.558)
Gender (female)	– 0.962	***	(0.325)
No ads sticker fixed effects	0.906	***	(0.311)
Newspaper fixed effects	– 1.066	*	(0.598)
Constant	– 2.202	**	(0.871)
[M1-2] Mailmix 1 – Overall	1.635	***	(0.617)
[M1-3] Mailmix 2 – Overall	2.889	***	(1.095)
[M1-4] Mailmix 3 – Overall	1.269		(0.873)
[M1-5] Mailmix 2 – Daily	1.284	**	(0.619)

Notes: Coefficients other than the estimates of the correlation of mailmix quality with reaction type are shown for M1-1 only. Models M1-2 to M1-4 include all variables of M1-1 except the fixed effect of also having received newspapers during the period observed. M1-5 contains the same explanatory variables as models M1-2 to M1-4. The base variable of the age category is age ≤ 30. The number of observations is 760. Asterisks *** indicate significance at 1 percent level, ** at 0.05 percent level and * at 10 percent level.

Table 4: *Effect of mailmix proxies on the reaction to addressed advertisement including total mail or unaddressed mail fixed effect [M2].*

Additional variable	**Total mail**		
Multinomial logit model	**Positive reaction**		
Basis: neutral reaction	**Odds ratio**		**Std.dev.**
[M2-1] Mailmix 2 – Overall	2.985	***	(1.120)
30 < Age ≤ 45	0.502		(0.573)
45 < Age ≤ 60	– 0.321		(0.595)
Age > 60	0.130		(0.565)
Gender (female)	– 1.019	***	(0.330)
No ads sticker fixed effects	0.961	***	(0.318)
Newspaper fixed effects	– 1.023	*	(0.601)
Total mail	– 0.016		(0.023)
Constant	– 2.189	**	(0.872)
[M2-2] Mailmix 1 – Overall	1.614	***	(0.619)
[M2-3] Mailmix 2 – Overall	3.132	***	(1.113)
[M2-4] Mailmix 3 – Overall	1.306		(0.869)
[M2-5] Mailmix 2 – Daily	1.275	**	(0.618)

Notes: Coefficients other than the estimates of the correlation of mailmix quality with reaction type are shown for M2-1 only. The variables included in models M2-2 to M2-5 are as described in Table 3, except for the additional control variable total mail . The number of observations is 760. Asterisks *** indicate significance at 1 percent level, ** at 0.05 percent level and * at 10 percent level.

5 Conclusion

While letter mail services have come under pressure due to the emergence of electronic communication channels, not all mail types are being substituted equally but the mailmix seems to degrade over time. This paper interprets the postal mail stream as a platform with two market sides carrying various types of mail of different value to the recipients which may interact with each other. Jaag and Bach (2016) argue that it would be beneficial for POs to take into account the positive effect of "good" mail by reducing its price and thereby increasing the attractiveness of the mail stream as a platform.

To provide first empirical support for this result, this paper hypothesizes that the value of direct mail to advertisers depends on the composition of mail. This hypothesis is tested by analyzing data from the Swiss mail market collected in the first quarter of 2016. Three mailmix proxies are defined to investigate the interdependencies between mail types. For all three mailmixes the results suggest that a good mailmix significantly increases the recipients' propensity of reacting positively to addressed advertisement. The paper therefore provides first empirical evidence that a differentiated pricing of mail based on its content might benefit the mail platform as a whole.

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