

E-Substitution and the Demand for Business Mail in the UK: Trends and Prospects

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1 Introduction

In recent years there has been a significant reduction in the volume of addressed letter mail in most developed countries including the UK (PwC 2013). Much of this decline has arisen from the substitution of letter mail by electronic modes of communication. Econometric estimates for the UK using methods outlined in Veruete-Mckay et al. (2011) indicate that in recent years this process has been advancing rapidly although other factors such as increases in GDP have mitigated some of this negative impact on letter mail volumes. Prospects for addressed letter mail will depend fundamentally on the future course of e-substitution, whose impact on the demand for mail varies across different content categories. For example, its impact on social or advertising mail may differ from that on business (or transactional) mail both in scale and process (PwC 2013; USPS 2010).

This chapter focuses on addressed business to consumer (B2C) business mail which constitutes a little under a half of all addressed inland mail in the UK and around three quarters of addressed business mail in total. Evidence is outlined on past trends in the e-substitution of this type of mail in the UK and the prospects for its further erosion to electronic substitutes considered over the long term. A theme

The views expressed in this paper are those of the authors and do not necessarily reflect those of the organizations to which they are affiliated.

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emphasized is that whether addressed mail is sent often depends not only on decisions of senders but also on the ability and willingness of recipients to accept communications electronically instead of by letter mail (Nikali 2008; De Donder et al. 2015). A framework is developed to assess the prospects for the e-substitution of business mail which takes account of the role of both senders and recipients and the possible extent of e-substitution is considered using scenario analysis. One dimension of particular interest is that of differences in mail received by age group of recipients, an area previously explored in Jimenez et al. (2006).

This chapter is structured as follows. Section 2 reports estimates of key trends in the e-substitution of business mail in the UK. The approach to the modeling of scenarios on possible future paths of e-substitution of B2C business mail is outlined in Sect. 3 and 4 reports some indicative values for two hypothetical scenarios in the years up to 2025. Section 5 concludes.

2 Trends in the E-Substitution of Business Mail

The extent of e-substitution is measured using an index, E_t , defined as (1– the proportionate loss of mail to e-substitution) where ($0 < E_t \leq 1$) and $E_t = 1$ represents a year t when there had been no overall net impact on mail volumes from e-substitution. A value of E_t of 0.8 in year t indicates that mail volumes were only 80 % of the level they would have reached in that year if there had been no impact on volumes from e-substitution. Estimates of E_t for addressed business mail in aggregate were derived from an econometric model of the demand for mail reported in Veruete-McKay et al. (2011). The methodology and derivation of the e-substitution index, E_t , which use the estimated coefficients from an updated equation of that model, were set out in Rodriguez et al. (2016).

Figure 1 reports estimates of E_t for business mail overall and by recipient age groups. These include also a relatively small impact of prices on volumes estimated by that model. From Veruete-McKay et al. (2011), the first year for which e-substitution is estimated to have had a discernible net impact on business mail volumes in the UK is 2002 implying that $E_t = 1$ in the years up to 2001. The development of e-substitution from the early 2000s is coincident with a sharp rise in the number of households with access to the Internet and the spread of broadband access.¹ The impact of e-substitution on business mail volumes in the UK accelerated from about 2010. It seems likely that the great recession of 2008–09 led firms to place even greater emphasis on lowering cost levels, increasing their use of electronic communication as part of that process. Industrial action at Royal Mail towards the end of the 2000s may have further contributed to the worsening trend of

¹The percentage of households with access to the Internet in the UK rose from 13 % in 1999 to 25 % in 2000, 36 % in 2001 and 42 % in 2002 (Office for National Statistics 2015a). Broadband access rose from virtually 0 % of households in 2001 to 11 % by the end of 2003 and 50 % by the start of 2007 (Ofcom 2005, 2014).

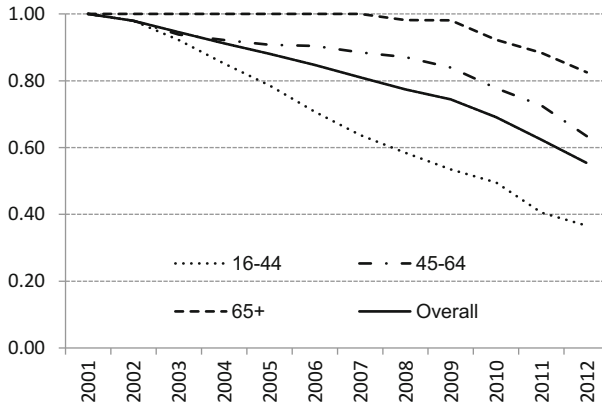


Fig. 1 Estimates of E-substitution Index, E_t , for business mail overall and by age group of recipients (2001 = 1). *Source* Royal Mail Group and author calculations. E_t equals (1 - proportionate loss to e-substitution) where $E_t = 1$ implies no overall e-substitution (last such year estimated as 2001) and $E_t = 0$ implies complete loss of all mail

business mail traffic from about 2010. From Fig. 1, while the average decline in business mail volumes due to e-substitution (including price effects) is estimated to have been a little under 4 % per annum from 2002 to 2009, from 2010 this decline is estimated to have accelerated to about 9 % per annum with the index, E_t , at 0.55 in 2012. More recently, business mail volumes in the UK have declined broadly in line with the post-2010 historical trend suggesting a continuation of e-substitution at this higher rate.

Rodriguez et al. (2016) also report estimates of e-substitution of B2C business mail by: content type (for example, financial statements and business letters); sender group (for example, banks and government); and age group of recipient. These estimates were derived by combining estimates of E_t with a time-series of data collected through a continuing internal business survey of individuals and their use and receipt of mail. Data from the survey were used to prepare estimates of volume shares of segments of B2C business mail and were available up to 2012. A number of assumptions were also made in deriving these disaggregated estimates of e-substitution.² Given these and that the data for the disaggregated estimates were from a sample survey, the estimates of e-substitution at a disaggregated level are best viewed as indicative of trends over time and subject to some element of noise and uncertainty.

Figure 1 shows estimates disaggregated by three age groups of recipients which suggest that there are substantial differences in the extent of e-substitution by age group with the greatest impact up to 2012 on the youngest of the age groups (who

²These included the use of estimates of E_t as a proxy for the equivalent index for B2C business mail as a whole and that the elasticities of demand for each segment of traffic with respect to variables such as GDP and population were equal.

Table 1 Percentage estimates of access by individuals in the UK to the Internet by age group

	Age group							
	16–24	25–34	35–44	45–54	55–64	65–74	75+	All
2012 Q3	98	97	95	90	80	58	26	82
2015 Q1	99	99	97	94	87	71	33	86

Source Office for National Statistics (2013a, 2015b). Percentage of individuals using the Internet by any device in the preceding 3 months

in 2012 received about a quarter of all B2C business mail) and the least on the oldest (who also received about a quarter of such mail in 2012). In part these differences reflect the higher level of access to the Internet of the younger groups reported in Table 1 but these differences are estimated to be less than the extent of e-substitution between the three age groups in Fig. 1. For example, in 2012 about 85 % of those in the UK aged 45–64 had used the Internet in the preceding three months compared with about 97 % for those under the age of 45. But, from Fig. 1, the E-indices for the two age groups were estimated to be 0.63 and 0.37 respectively and the difference between these indices is over twice that in rates of access to the Internet. In addition to differences in the ability to receive e-communication, a second factor impacting on the extent of e-substitution is likely to be the willingness of individuals to receive communication electronically even where they have access to the Internet.

3 Methodology for Modeling Scenarios of Future Paths of Business Mail E-Substitution

(i) Decomposition of the e-substitution index. The starting point for modeling possible future losses of addressed B2C business mail to e-substitution is a decomposition of the e-substitution index, E_t . The potential effects of decisions regarding e-substitution by senders and recipients of mail are considered separately while, for both, a distinction is drawn between the ability to send or receive an electronic substitute in place of business mail and the willingness to do so.

On the sender side, the proportionate reduction of mail that senders would wish to achieve can be considered as the product of their ability to send e-communications (θ_s) (defined as the proportion of communications from senders in time period t that could be mailed (and would have been mailed prior to the development of e-substitution) for which senders have the technology to communicate electronically ($0 \leq \theta_s < 1$)) and their willingness to do so (π_s) (the proportion of communications from senders in time period t that could be mailed for which senders have the technology to communicate electronically and, in fact, wish to send in this way and so displace letter mail ($0 \leq \pi_s < 1$)). For example, if in time period t senders were able to send electronically a proportion θ_s of a particular

segment of communication that could be mailed while, of this volume, senders wished to send a proportion π_s electronically rather than by letter mail then the overall proportionate loss in mail to e-substitution that senders of that segment of communication would wish to achieve would be the product of these two parameters, $\theta_s \pi_s$, assuming that the ability and willingness of senders to substitute electronic communication for letter mail are independently distributed. Where senders are able “unilaterally” to communicate electronically without the agreement of recipients, $\theta_s \pi_s$ would also represent the proportionate loss in mail that could be achieved by senders. For example, some bank statements could be sent quarterly rather than monthly without a recipient being required to enable such a change.

However, whether senders are able to substitute out of business mail sometimes depends also on recipients’ ability and willingness to receive communications electronically that currently they receive as mail. For example, bills and invoices can be settled through on-line payment but this requires the recipient to have both the ability to settle an invoice in this way and the willingness to do so. Where e-substitution of business mail by senders requires the explicit involvement of recipients, such mail can be described as “bilateral” or “actionable”. This potential involvement by recipients can be viewed also as being the product of two factors: the ability of recipients to accept e-communications (θ_r) (the proportion of communications that could be mailed (and would have been mailed prior to the development of e-substitution) which is received by individuals who have the technology to accept e-communications ($0 \leq \theta_r < 1$)) and their willingness to do so (π_r) (the proportion of communications that could be mailed which is received by individuals who have the technology to receive e-communications and wish to accept an e-communication instead of letter mail ($0 \leq \pi_r < 1$)). The overall proportionate loss of mail to electronic communication that recipients would wish to accept would then be $\theta_r \pi_r$. Bringing together these two sides, senders in period t would wish to send electronically a proportion $\theta_s \pi_s$ of communication that could be mailed but if all of that communication were bilateral then recipients either through a lack of ability to accept e-communication or a lack of willingness to do so would only wish to accept $\theta_r \pi_r$ of such a displacement. In the bilateral case then the proportionate loss of mail to e-substitution would be the product of $\theta_s \pi_s \theta_r \pi_r$ (again assuming that the mail that senders wish to displace with e-communication is distributed across potential recipients independently of the distribution of recipients that are able and wish to have mail displaced by an electronic substitute and those that are either unable or do not wish to accept this) and the e-substitution index in period t , E_t , can be written as:

$$E_t = 1 - (\theta_s * \pi_s * \theta_r * \pi_r) \quad (1)$$

For unilateral mail, Eq. (1) simplifies the proportionate loss of mail to e-substitution to $\theta_s \pi_s$. Mail prices also affect e-substitution of B2C business mail in various ways and, although the model set out here does not incorporate such linkages explicitly, in general, an increase in the relative price of mail will lead to an increase in one or

more of the parameters in the model and hence in e-substitution.³ Note also that the parameters on the right hand side of (1) are assumed to have an upper bound at less than 1. Those maxima are of importance as they directly affect the potential minimum value of E_t for B2C business mail overall over the very long term.

(ii) Calibration of 2012 base. The approach used to model future e-substitution of B2C business mail was based on (1). Data were available segmented by content type i (6), sender group j (6) and age group k (6) or a total of 216 segments. The model was calibrated at this level of disaggregation for 2012. For each of these segments an estimate was made of the corresponding e-substitution index using information on volume shares of these disaggregations and a number of constraints to ensure model consistency. For θ_s and π_s some evidence was provided by internal surveys of senders of mail. In the case of θ_r , ONS data on access to the Internet represent a proxy for individuals' ability to receive electronic communications and use was made of the estimates reported in Table 1 for 2012Q3. There was no direct information to calibrate the parameter, π_r . However, with estimates or assumptions for the other elements in (1), rearrangement and solution of that equation provided an initial estimate of π_r and a procedure was then applied to ensure that the condition that $\pi_r < 1$ was satisfied in the few cases where an initial estimate violated that constraint.

Information on the calibration values of these parameters is reported in Table 2. The upper part of the table records qualitative indicators for the largest ij pairs of traffic by volume (for example, "Bills and invoices" sent by Utilities) which together constituted well over a half of all B2C business mail traffic in 2012. On a five-level scale from "Low" to "High", the first column provides an indication of the assessed sender ability and willingness to communicate electronically from the calibration of θ_s and π_s and hence $\theta_s\pi_s$. In nearly all the segments these indicators are either "High"⁴ or "Medium to High" based on the numerical values applied in the model. The second column reports equivalent indicators for recipients' ability and willingness to receive e-communications from the calibration of θ_r and π_r and hence $\theta_r\pi_r$. In all of the segments these indicators range from "Low" to "Medium". The final column of Table 2 reports qualitative indicators of the extent of e-substitution estimated to have occurred in each of these segments by 2012 measured through e-substitution indices, E_t . Segments where e-substitution is estimated to have advanced most by that time include "Bills and invoices" sent by Utilities⁵ and "Statements" sent by Retailers. The extent of e-substitution is

³For example, if the prices of business mail increase, senders will tend to send less mail where they can (unilateral mail) either by introducing technology to do so or, where they have this, potentially increasing its use (that is, θ_s , π_s increase with the price of mail so that E_t declines). More generally, similar effects arise where other costs of sending mail increase or the price of substitutes falls for it is relative prices that matter.

⁴From the key to Table 2, for "High": $0.90 \leq \theta_s\pi_s < 1$.

⁵From the key to Table 2, for "Medium to High": $0.25 \leq E_t < 0.50$.

Table 2 Calibration of sender and recipient ability and willingness to send and receive e-communications, 2012 base

Content by sender	Sender ability and willingness	Recipient ability and willingness	Extent of E-substitution
1. Bills and invoices sent by:			
Utilities	High	Medium	Medium to High
2. Business letters sent by:			
Banks	Medium to High	Low to Medium	Medium
Government	Medium	Low to Medium	Low to Medium
Insurance companies	Medium to High	Low	Low
Other Businesses	Medium	Medium	Medium
3. Insurance, legal, financial documents sent by:			
Insurance companies	High	Low to Medium	Medium
4. Statements sent by:			
Banks	Medium to High	Low to Medium	Low to Medium
Retailers	High	Medium	Medium to High
5. Other financial correspondence sent by:			
Banks	Medium to High	Low to Medium	Medium
Government	Medium	Low	Low to Medium
Insurance companies	Medium to High	Low to Medium	Low to Medium
6. Other B2C Business Mail sent by:			
Banks	High	Medium	Medium to High
Age group of recipient			
16-34	Medium to High	Medium to High	Medium to High
35-44	Medium to High	Medium to High	Medium to High
45-54	Medium to High	Low to Medium	Medium
55-64	Medium to High	Low	Low to Medium
65-74	Medium to High	Low	Low to Medium
75 and over	Medium to High	Low	Low
Keys:	Sender and recipient columns:	E-substitution column:	
	0.90 ≤ High < 1	High < 0.25	
	0.75 ≤ Medium to High < 0.90	0.25 ≤ Medium to High < 0.50	
	0.60 ≤ Medium < 0.75	0.50 ≤ Medium < 0.60	
	0.45 ≤ Low to Medium < 0.60	0.60 ≤ Low to Medium < 0.85	
	Low < 0.45	Low ≥ 0.85	

Source Royal Mail Group and author calculations

estimated to have been lower for content types “Business letters” and “Other financial correspondence” and for B2C business mail originating from Insurance companies and Government.

The lower part of Table 2 reports equivalent information by age group of recipient. As the content types and sender groups sending mail vary little across age groups, sender ability and willingness to send electronic communications in place of letter mail are assessed to be at the overall average for B2C business mail in 2012 of “Medium to High”. However, from Fig. 1, there are significant differences by age group estimated in the extent of e-substitution which are reflected in the final column of Table 2. Underlying these differences then are even more marked variations across age groups in the ability and willingness of recipients to receive electronic communication.

(iii) Modeling of parameters for scenarios. From the base developed for 2012 it is possible to explore a number of long term hypothetical scenarios and two are considered for the period up to 2025 by modeling possible levels of e-substitution in three years: 2015, 2020 and 2025. For 2015 use was made of three main sources. The first of these was extrapolation and sensitivities around these of recent trends in overall e-substitution of B2C business mail from econometric estimates of E_t . Second, survey data were available on the expectations of businesses for the e-substitution of B2C business mail. Third, use was made of ONS information on trends in access to the Internet as a way to inform prospective movements in the parameter θ_r by age group of recipients. Additionally, it was necessary to make assumptions regarding other parameters in the model at a disaggregated level set within the envelope determined by the information outlined above.

However, for 2020 and 2025, it was more difficult to obtain useful information from surveys of senders and recipients as the timescale extends outside of respondents’ range of likely knowledge. Similarly, extrapolations from an econometric model estimated on historical data become less informative over the very long term as further structural change may occur. Indeed, it is the possibility of exploring such developments that makes scenario analysis useful. So scenarios for 2020 and 2025 were developed directly from assumptions for the parameters on the right hand side of (1) implying changes in the mix of B2C business mail over time. As shown in Table 2, the values for the sender parameters were for many disaggregations already high by 2012 and the main factors affecting the future path of e-substitution of B2C business mail are likely to be on the recipient side.

Two separate factors influence the path of each of these parameters, outlined here in the case of θ_r . First, a population cohort born in period l may increase, over time, the proportion of communication it receives which can be accessed via the Internet (an “accessibility effect”). Second, younger and middle aged groups have greater access to the Internet currently than older groups and, over time, as they age and themselves enter older age groups the access to the Internet of that older group will reflect that higher level of access being carried forward by the younger cohort

(an “ageing effect”). Indeed, this effect may be enhanced as this younger cohort itself may increase the proportion of communication which it can access through the Internet.

To separate these effects groups were defined by their year of birth (which do not change over time) rather than their age (which do). The proportion of a segment of communication received by individuals in age group k with the ability to receive e-communications in year $t = (2015 + m)$ is given by:

$$\theta_{rk} = \sum_{l \in k} \theta_{rl} \cdot \left(\frac{P_{l \in k}}{P_k} \right) \quad (2)$$

where m is the number of years after 2015; θ_{rl} is the proportion of a segment of communication that could be mailed (and would have been mailed prior to the development of e-substitution) received by individuals born in period l with the ability to receive e-communications in year $t = (2015 + m)$; $P_{l \in k}$ is the population born during period l which is within age group k in year $t = (2015 + m)$; and P_k is the population of age group k in year $t = (2015 + m)$. The summation is over all population cohorts born during periods l which are contained in age group k in year $t = (2015 + m)$. In applying this approach use was made of population projections for the UK by cohort from the ONS (2013b) and these were combined with assumptions for ability to receive e-communications by cohorts defined by age in 2015, θ_{rl} . A similar approach and equivalent expression to (2) was used for modeling the future path of π_r . In that case, in addition to the ageing effect outlined above, in place of an accessibility effect there is an “acceptance effect”.

4 Hypothetical Scenarios

(i) Outline of hypothetical scenarios. Given the high degree of uncertainty about the future course of the e-substitution of B2C business mail, two hypothetical scenarios were evaluated using the framework set out in Sect. 3. In both, e-substitution advances significantly further than the estimates for 2012 leading to a very high level of e-substitution overall and are referred to as the “Lower rate of advance of e-substitution” scenario (LES) and “Higher rate of advance of e-substitution” scenario (HES). The path of e-substitution in these scenarios depends on two proximate factors. The first of these is the extent to which either the ability or willingness of senders and recipients of B2C business mail to substitute or accept e-communications in place of letter mail turns out to be less than complete (that is, the extent to which the maximum values of θ_s , π_s , θ_r and π_r prove to be less than 1). These assumptions underpin the scenarios on the overall extent of e-substitution over the very long term. The second factor is the pace of approach to these maxima.

Each of the parameters in the model is likely to reach a maximum value close to but below unity. From the sender side, while all firms effectively have the means to communicate electronically, other factors potentially limit the ability of senders to substitute out of letter mail (θ_s). These include mail where a physical signature is required; items that cannot be sent electronically (for example, bank cards); and where there is a regulatory or legal requirement for delivery through letter mail. In both scenarios it is assumed that such types of communication represent only a very small constraint on the ability of senders to substitute out of letter mail (a maximum of $\theta_s = 0.99$).

With regard to senders' willingness to substitute e-communications (π_s), again there are reasons for senders to be likely to wish to maintain some communication by letter mail. These include: concerns with respect to security and proof of identification when dealing remotely with new customers (for example, applying for a credit card); increasing levels of high value actionable activity (for example, notification of hospital appointments and reminders to attend expensive publicly funded treatment or procedures); legal requirements or precautionary communications that protect large businesses from accusations of taking advantage of customers (for example, when changes are proposed to banking provided services); and where senders wish to maintain and develop a relationship with recipients (for example, when offering new customers welcome packs and, in the absence of having a physical local presence, maintaining some limited contact via letter mail to encourage cross-selling or renewing existing contracts at a future date). In both scenarios values of π_s are assumed to be extremely high and at 0.99 by 2025 in HES and lower than this but above 0.90 in LES for reasons outlined above, except in the case of government senders where slightly lower values are assumed in both scenarios.⁶ In terms of the scaling and segmentation reported in Table 2, on the sender side, sender ability and willingness to substitute e-communications for letter mail are assumed in 2025 to be at "High" in nearly all ij pairs of traffic in both scenarios so that the differences that arise between the scenarios are principally from assumptions regarding recipients.

As indicated in Table 1, by 2015 accessibility to the Internet was already close to its maximum level for younger individuals. However, these rates were well below saturation for groups aged over 65. For the ability to receive e-communications, θ_r , to increase further requires access to the Internet among these older age groups to rise. As discussed, this can be expected to occur through the combination of rising access to the Internet for a population born during a given period and the ageing over time of younger cohorts with higher access into older age groups. By 2025, both scenarios assume that such access will rise from an average of about 86 % in 2015 to the mid-90s percent but with the oldest groups still having access to the Internet below younger groups. Further, fast broadband services may not be

⁶While some Government digitization programmes are achieving significant online penetration (such as annual tax self-assessment returns) others are not expected to e-substitute at all (PwC 2013).

available even in completely developed networks in all locations so also restricting the maximum potential value of θ_r .

Perhaps the greatest uncertainty regarding the future path of e-substitution of business mail relates to the extent to which recipients will be willing to accept e-communication as a substitute for letter mail. There are a number of reasons for expecting this parameter in the model, π_r , to reach a maximum level below unity. These include recipients wishing to receive paper copies for records or confirmation of address; being less comfortable or effective in the use of electronic means of communication and so preferring letter mail; pre-empting the digital clutter that often develops once communication takes place electronically; and having concerns about and limiting the use of electronic media on grounds of security or privacy, particularly, for example, in the cases of high value business transactions and legal documents. A number of these factors are based on “deep, scientifically established, psychological instincts” and emotional effects which result, on average, with people valuing physical letter communications more highly than electronic mail (Royal Mail Group 2015).⁷ It is likely that such factors will persist and change slowly over time amongst older recipients of mail suggesting lower values for π_r for these groups. The two hypothetical scenarios differ most in the extent to which they differentiate assumptions on π_r . In LES, the maximum values assumed for π_r are lower and the pace at which they are approached less rapid than in HES.

Assumptions on recipient ability and willingness to receive e-communications in place of letter mail in LES are one or two levels higher on the scale used than the base year values reported in Table 2 (for example, scalings of “Low to Medium” in 2012 rise to either “Medium” or “Medium to High” in 2025). The assumptions in HES are generally two or three levels higher reflecting both higher long term maxima for π_r and a more rapid pace of approach to these higher values. The implications of these assumptions on sender and recipient willingness for the modeled extent of e-substitution in 2025 are that even in LES, all ij pairs of traffic in Table 2 have e-substitution which is assumed to rise to “Medium to High” while in HES this is so to the scale of “High” for nearly all of the segments. This is also the case by age group k except for those aged 75 and over.

(ii) E-substitution and B2C business mail volumes. Figure 2 plots E-indices for both scenarios up to 2025. The values for 2015 and 2020 have been calculated using the approach outlined in Sect. 3 and summarized in this section for 2025 with values for other years interpolated. The E-index for 2025 under LES is 0.25 compared with an estimate of 0.55 in 2012; that is, while in 2012 B2C business mail is estimated to have been just over a half of the level it would have reached if there had been no impact from e-substitution, by 2025 under LES that fraction would have dropped to a quarter. Under HES the E-index is 0.11. Compared with the post-2010 historical trend of a decline in B2C business mail from e-substitution

⁷For example, Royal Mail Group (2015) shows that the “value” of paper communications is higher than via email in terms of recipients taking the communication more seriously, imparting a better impression of the sender and making the recipient feel more valued.

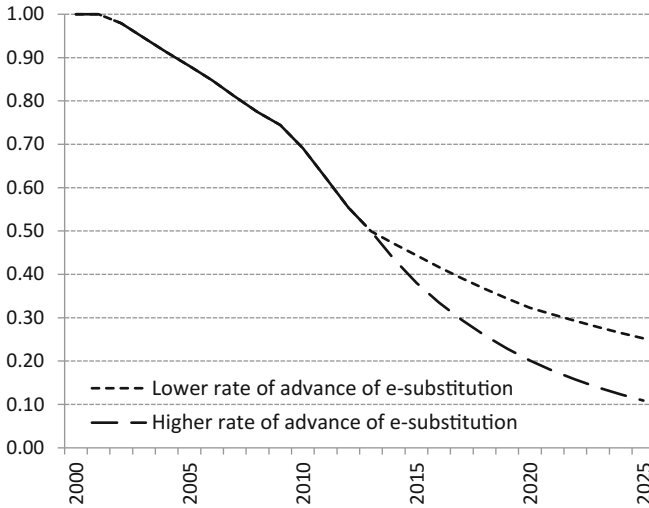


Fig. 2 Estimates of E-substitution index, E_t , to 2012 and two hypothetical scenarios to 2025 (2001 = 1). *Source* Historical estimates from Royal Mail Group and author calculations; hypothetical scenarios constructed by authors

of about 9 % per annum, under LES this rate reduces to about 6 % per annum between 2015 and 2020 and under 5 % between 2020 and 2025. By contrast, under HES the impact of e-substitution accelerates to between 11 and 12 % per annum up to 2025. The two scenarios also differ in that under LES the share of these reduced volumes received by younger and middle aged groups, although contracting compared with estimates for 2012, remains higher than under HES.

The econometric model set out in Veruete-McKay et al. (2011), which underpins the e-substitution framework developed in this chapter also identifies positive impacts on mail volumes from economic and demographic growth which partially offset the negative impact from e-substitution. Using the updated elasticities for these variables reported in Rodriguez et al. (2016) (mail volumes with respect to GDP and population⁸ respectively of 0.9 and 1) it is possible to produce estimates for B2C business mail volumes under the two hypothetical scenarios. Applying these elasticities, the cumulated impact on mail volumes from population (using population projections from the ONS) and GDP (assuming trend growth in GDP of a little over 2 % per annum) would imply mail volume growth of just under 50 % between 2012 and 2025 or about 3 % per annum. The E-indices from the two hypothetical scenarios can be used to factor these trend extrapolations. Using this

⁸The demographic variable in Veruete-McKay et al. (2011) is number of households rather than population but the latter is used here as a proxy. A demographic variable is introduced separately into that model and reflects approximately delivery point growth and its additional effect on demand for mail rather than the direct impact of demography on total economic activity which is captured by the GDP term.

approach, under LES the volume of B2C business mail in 2025 would be around two thirds of its level in 2012. Under HES the volume of mail implied would be barely a third. In terms of growth rates, under LES volumes would decline by about 3 % per annum between 2015 and 2020 and slow down to less than 2 % per annum between 2020 and 2025; that is, by about 3 % less than the decline due to the effects of e-substitution from the positive effects of population and GDP growth. Under HES, however, despite the mitigating effects of these factors, B2C business mail volumes would decline by between 8 and 9 % per annum.

5 Conclusions

This chapter has presented estimates of reductions in the volume of business (or transactional) mail in the UK as a result of electronic substitution. These estimates have been derived from econometric modeling of the demand for business mail (and include also a relatively small impact on prices estimated by that model) and indicate that e-substitution impacted negatively on business mail volumes from about 2002. By 2012 (the last observation available at the time of modeling) business mail volumes were estimated to be only a little over a half of the level they might have been expected to reach based on the impact of other factors affecting these volumes such as GDP and demography after excluding the estimated impact of e-substitution.

The chapter considers the prospects only for B2C business mail in the UK. The framework for assessing these focuses not only on the ability and willingness of senders to communicate on-line rather than by letter mail but also, for many types of business mail, on the ability and willingness of recipients to accept e-communications in place of letter mail. For example, bills and invoices can be settled through on-line payment but this requires the recipient to have both the ability to settle a bill in this way and, importantly, be willing to do so even when such access is in place. Estimates (from the ONS) indicate that access to the Internet among older individuals in the UK is less than complete and (from modeling) that there has been a lower level of e-substitution to date for older individuals, even allowing for this lower ability to receive e-communications.

Given the high level of uncertainty regarding the prospects for e-substitution over the long term, the modeling framework developed in this chapter is used to consider the possible path of the e-substitution of B2C business mail volumes up to 2025 through two hypothetical scenarios. The scenarios are distinguished primarily by differences in the extent to which senders wish to substitute e-communication for letter mail and the willingness of recipients to accept such changes.

Econometric estimates of the demand for business mail indicate that GDP and demography continue to exert positive impacts on these volumes so it is likely to be the combination of these two opposing sets of factors which will determine the future path of business mail volumes overall. Compared with recent rates of decline of 5 to 6 %, the two hypothetical scenarios point to a wide possible range for

business mail volume decline with prospects over the next decade being highly dependent on the extent and pace with which recipients of paper communications are able and willing to replace them with electronic alternatives. The less able and more reluctant mail recipients are, especially older individuals, the more likely a significant slowdown in the rate of letter decline, perhaps nearing broadly flat levels of volumes in the UK within the next decade. By contrast, if older individuals engage more actively with Internet related technologies and their willingness to adopt e-communications increases substantially there is a risk that the rate of business mail volume decline in the UK will be considerably higher and could approach near double digit rates of decline, as is the case today in some Scandinavian countries.

Ultimately the long term prospects for business mail will depend on sender and recipient choices and how these are impacted by technological developments, postal policy and attitudes to the use of mail relative to electronic substitutes. These factors are, however, inherently highly uncertain. Scenario analysis using a sender-recipient framework can be used by postal operators to explore some of these uncertainties in more depth, as well as examining opportunities to implement strategies to dampen the decline in letter mail in specific sender-recipient segments. An extension of the framework outlined in this chapter for future research could be a more explicit treatment of the impact of prices on senders' willingness and recipients' acceptance to substitute mail for electronic communications and the impact this could have on the long term rate of decline in letter traffic.

References

- De Donder, P., Cremer, H., Rodriguez, F., Soteri, S., & Tobias, S. (2015). Analyzing the prospects for transactional mail using a sender-recipient framework. In M. A. Crew & T. J. Brennan (Eds.), *Postal and delivery innovation in the digital economy*. Berlin: Springer.
- Jimenez, L., Owsiany, A., & Szeto, C. (2006). Scenarios of mail recipient patterns across generations. In M. A. Crew & P. R. Kleindorfer (Eds.), *Liberalization of the postal and delivery sector*. Broadheath: Edward Elgar.
- Nikali, H. (2008). Substitution of letter mail for different sender-receiver segments. In M. A. Crew & P. R. Kleindorfer (Eds.), *Competition and regulation in the postal and delivery sector*. Broadheath: Edward Elgar.
- Ofcom (2005, 2014). *Communication Market Report 2005* (2014).
- Office for National Statistics. (2013a). *Internet quarterly update, Q1 2013*.
- Office for National Statistics. (2013b). *2012-based population projections by single year of age and sex. United Kingdom. Projection type: Principal assumptions*.
- Office for National Statistics. (2015a). *Internet access—households and individuals, 2015*.
- Office for National Statistics. (2015b). *Internet users, 2015*.
- PwC. (2013). *The outlook for UK mail volumes to 2023*. <http://www.royalmailgroup.com/sites/default/files/The20%Outlook20%for20%UK20%mail20%volumes20%to20%2023.pdf>
- Rodriguez, F., Soteri, S., & Tobias, S. (2016). *The impact of e-substitution on the demand for mail: Some results from the UK*. Paper presented to 9th Postal Economics Conference on E-commerce, Digital Economy and Delivery Services, University of Toulouse, March 31, 2016 available at

<http://idei.fr/conferences/2016-ninth-biannual-postal-economics-conference-e-commerce-digital-economy-and-delivery-services?page=1>

Royal Mail Group. (2015). *The private life of mail*. <http://www.mailmen.co.uk/reports>

USPS. (2010). *Projecting US mail volumes to 2020: Compendium*, available at <http://www.prc.gov>

Veruete-McKay, L., Soteri, S., Nankervis, J., & Rodriguez, F. (2011). Letter traffic demand in the UK: An analysis by product and envelope content type. *Review of Network Economics*, 10(3).