



**INSTITUT
D'ECONOMIE
INDUSTRIELLE**

The implications of liberalising the postal sector on welfare and pricing

Philippe De Donder¹

Helmuth Cremer²

Frank Rodriguez³

February 2015

¹ Toulouse School of Economics (GREMAQ-CNRS and IDEI). Email: philippe.dedonder@tse-fr.eu

² Toulouse School of Economics (GREMAQ-University of Toulouse Capitole 1 and IDEI) and Institut universitaire de France. Email: Helmuth.cremer@tse-fr.eu

³ Oxera.

1. Introduction

This note synthesises several research papers that IDEI has produced together with Royal Mail economists and others since 2000 and summarises their findings on the welfare and pricing implications of opening the postal market to competition, when the national postal operator operates under different regulatory requirements (e.g. price constraints or universal service obligations) and according to the competition regime (such as access only, bypass only, access and bypass) which emerges in the market following its liberalisation.⁴

The understanding of the postal sector and of likely effects of different types of regulation requires taking appropriate account of the specific nature of this industry. We then start this note (section 2) by mentioning the most important characteristics of the sector, which renders it different from other network industries such as telecoms or energy.

We then summarise in section 3 the research papers. All papers share the same form: they start with a specific research question, build a formal model incorporating the relevant characteristics of the postal sector given this research question, and then provide numerical results based on a calibration of this model to a generic European postal market. The calibration assumptions are not from a particular postal operator, but are reflective, in our view, of the general nature of postal markets and cost structures found in published empirical studies. The same calibration assumptions are used in all papers, except when assumptions are updated to reflect the results of newly available empirical studies. In most of the papers we have checked the robustness of our results through sensitivity testing of key calibration values. However, we should stress that these results are indicative and in any particular country, for example the UK, a more detailed empirical exercise would be necessary to model prospective effects directly.

Section 4 concludes with a brief summary of the main results surveyed here.

⁴ The term "direct delivery" competition is used in the UK to refer to final mile delivery competition, which has traditionally been referred in the postal economics literature as "bypass" competition.

2. The specific nature of the postal industry

It is very important for the understanding of the working of the postal sector to keep in mind that this sector has several relevant characteristics which are not shared with other regulated sectors, such as the telecoms or the energy sector. We start this note by mentioning those characteristics.

The postal activities can be regrouped into upstream activities (collection, inward and outward sorting and transportation) and downstream activities (delivery). While upstream activities can, and often are, organised as competitive activities, the downstream segment concentrates a very large fraction of the costs of the industry and exhibits substantial returns to scale. Moreover, these returns to scale differ significantly across geographical areas, mainly between rural and urban areas (there is a substantial literature which supports these points. See for instance Cazals et al (2005)).

These returns to scale reflect the fact that a large part of the delivery costs are indeed fixed – i.e., independent of the volumes delivered. The size of the fixed costs is due not only to the technology, but also to universal service obligations (USOs from now on) imposed on the universal service provider (USP), such as the obligation to deliver 5 or 6 times a week everywhere in the country.

This in turn raises the question of the type of competition that can be accommodated in the postal market while ensuring the financial viability of the USP. Competition can be limited to the upstream activities, with entrants accessing, for a fee, the USP delivery network, or it can be end-to-end, with the entrant undertaking both the upstream and the downstream activities.

Another specificity of the sector is that most volumes are emitted by businesses (and addressed either to other businesses or to households), and that a small number of large firms represent an important fraction of total volumes.

Since entrants can choose which products to offer (focusing for instance on large senders of bulk mail), at what prices, and whether, for each delivery region, to access or to bypass the USP delivery network, there is a large risk of cream-skimming, where entrants concentrate on products/regions where costs are low compared to USP prices, leaving to the USP the unprofitable segments. This danger is reinforced when the USP is subject to USOs, such as geographically uniform prices, or non optimal price cap formulas, which prevent it from competing on a level playing field with entrants on each separate market and for each separate product.

These problems are compounded by the fact that entrants often offer products which are not very differentiated from the products offered by the USP. This means that a large fraction of the volumes sold by entrant are indeed displaced from the USP, rather than constituting an expansion of volumes for the whole industry. Given the cost structure of the USP (for technological and USO related reasons) and the importance of fixed costs, entry then increases the average cost of the USP and endangers its financial viability and/or forces the USP to raise its prices, generating welfare costs for final consumers.

All these traits have been introduced in the research contributions developed in common between IDEI and Royal Mail economists, and summarised in the next section.

A new characteristic of the sector has emerged since the early 2000s: the structural rate of decline in volumes in the sector. This trend is now present in all countries with advanced postal networks. Part of these declines can be attributed to the worldwide recession, but it has become increasingly clear with time that a large part is due to the advent of electronic substitutes, and that volumes won't return to pre-crisis levels. The impact of entry in the postal market is to reinforce those declines in volumes for the USP. With one exception studied in section 3.4 below, this structural decline of volumes has not yet been introduced in our work.⁵ We come back in section 4 to the likely impact that this trend could have on the results we now summarise.

3. Synthesis of several research papers on the pricing and welfare consequences of postal liberalisation

We start by providing a roadmap of the territory covered by the research papers. We have identified 6 themes, which follow a logical and chronological progression. With one exception, each theme is constituted of two research papers (with, for themes 2, 3, and 6, the addition of a more academically oriented paper published in a peer-reviewed journal). For each theme, we start with the research question, we provide a summary of the main assumptions embedded in the model and we then explain the main results obtained. At the end of each theme, we provide a summary of the main results of the theme in a synthesis box.

We first study (in section 3.1) the impact of opening the postal market to competition on the uniform pricing requirement (same price across geographical areas and across different types of senders and recipients of mail) and on the financial position of the universal service provider (USP hereafter). This opening generates a financial loss for the USP, which we dub the cost of continuing to meet the USO under liberalisation, or COMUSOUL. We study and compare various instruments to fund the COMUSOUL. In this model, competition happens across the board (in both urban and rural areas) and is of the end-to-end variety.

In the next section (3.2), we introduce the possibility for entrants to access the USP delivery network in each area, or to bypass this network and to compete end-to-end. Following the European Directive of 2002, we also allow customers to access the USP's delivery area (Customer Direct Access, or CDA), and we study the optimal access charges formulation in this environment, and especially how it impacts the financial sustainability of the USO for the USP.

⁵ We have produced several research papers with Royal Mail economists and others where we look at the micro-economic decision by senders to substitute electronic media for paper mail, but we have not undertaken a full analysis of the impact of e-substitution, and more generally, structural decreases of postal volumes, on the questions studied in this note.

We have assumed in the first two sections that the prices posted by the USP maximise welfare subject to the USP breaking-even, when possible (that is, the so-called Ramsey prices solution). In section 3.3, we explicitly introduce price setting constraints imposed on the USP. We study a global price cap (GPC) which in effect decentralises the Ramsey prices, but also other, non-optimal, pricing constraints often used in practice, such as the Equi-Proportional Mark-Up (EPMU) or the minimisation of the single-piece (SP) mail price.

Studies presented from section 3.4 onwards are directly influenced by the third European Directive of 2008. All papers assume a de facto monopoly of the USP over the selling of SP mail, and competition over the provision of (various types of) bulk mail (BM). Section 3.4 studies the concepts of “unfair financial burden” and of “net cost” of USO introduced in the Directive. More precisely, it analyses how variations in the USO requirements translate into the financial viability of the USP.

Since it had become increasingly clear that, as in other regulated network sectors, the organisational structures of the USP may come under regulatory review, section 3.5 studies the impact of organisational structures and of USOs on pricing and welfare. More precisely, we study the interactions between a Mail Network Operator (MNO) and a Retail Business (RB) in the context of (access and bypass) competition, when various (pricing and organisational) constraints are imposed.

Finally, section 3.6 studies the impact of the advent of electronic substitutes, both to Non Direct (or transactional) Mail (NDM) and to Direct (or advertising) Mail (DM), on the postal market, the viability of the USO and the aggregate welfare level.

3.1. Uniform pricing, USO and market liberalisation

Our first contributions have tackled the issue of the impact of opening the postal market to competition on the uniform pricing constraint imposed on the USP, and on the financial viability of this USP. In De Donder et al. (2001) and De Donder et al. (2002), we consider two types of senders and of recipients (businesses and households) and two regions (for the destination of letter mail): urban and rural. Crossing these categories, we have $2*2*2=8$ submarkets. The starting situation has a single postal operator, the incumbent, which maximises total welfare in the economy (i.e., the sum of profits and of consumers’ surplus) under the constraint that the operator breaks even (the so-called "Ramsey problem"). USOs take two forms in this setting: an explicit form, with a requirement of uniform pricing (the same price has to be posted in all markets, i.e. irrespective of the type of the sender, of the recipient, and of the destination region), and an implicit form, where non-modelled USOs (in terms of quality, frequency of delivery, etc.) result in a fixed cost for the incumbent (the cost of building up a collection, sorting, transportation, but mainly delivery network necessitated by these constraints). The model studies the impact of the opening of the whole market to competition.

In De Donder et al. (2001), we assume that a single operator competes with the incumbent on all submarkets. The main results are threefold: (i) the uniform price which maximises welfare under break-even constraints under monopoly does not allow the incumbent to break-even after opening of the market to competition; (ii) allowing the incumbent to post differentiated prices after the opening of the market to competition leads to increases in welfare, and (iii) even with differentiated prices, the incumbent does not manage to break-even. In other words, alleviating the uniform pricing requirement of the USO leads to a larger total welfare, but is not sufficient to allow the incumbent to break even.

In the light of these results, De Donder et al. (2002) studies different ways to help the incumbent/USP to break-even, and the consequences of these instruments on welfare. The model developed is the same as De Donder et al. (2001), except that we allow for two potential entrants. Each entrant has the same variable costs as the USP, but faces no fixed costs. The absence of fixed costs for entrants reflects the fact that they are not subject to USOs. Our modelling then makes way for entrants, since consumers are assumed to benefit from the variety of products offered (mail products offered by different postal operators are imperfect substitutes to each other), while the offering of new products does not require the costly duplication of networks (no fixed costs for entrants).

As in De Donder et al. (2001), opening the market to competition does not allow the USP to break-even when it continues to charge the uniform price which maximises welfare under break-even in the monopoly situation. We call this loss the cost of continuing to meet the USO under liberalisation, or COMUSOUL. We then investigate various ways to fund this COMUSOUL. We first allow the USP to vary its prices, including posting differentiated prices in all 8 sub-markets. We then study the introduction of a compensation fund, where postal operators pay a tax whose proceeds end up in a fund used to compensate the USP. We study both the case of an excise per item, and of a proportional tax. The main result we obtain is that neither pricing flexibility alone, nor the compensation fund alone allows the USP to break-even. It is then necessary to use both instruments at the same time for the USP to break-even. In this case, we observe that the total (after tax) profit of the entrants is larger than the increase in total welfare (comparing with the pre-liberalisation level), so that both types of consumers (firms and households) lose from the liberalisation. So, opening up the postal market benefits exclusively the postal entrants, at the expense of the consumers, because the boost in welfare from benefiting from new and differentiated products is smaller than the increases in (tax included) prices necessary for the USP to break-even.

We then study the case of partial liberalisation, where the USP keeps a reserved area. More precisely, we assume that the USP retains a monopoly position on the same proportion of the 8 submarkets, and is allowed to increase its (monopoly) price on this reserved area while it faces competition on the non-reserved area. In other terms, the USP adjusts its prices so that the profit it makes in the reserved area exactly compensates the losses it makes in the competitive part of the

markets, where it faces the two entrants. We look for the optimal size of the reserved area --i.e., the degree of liberalisation that maximises social welfare while allowing the USP to break-even. We obtain three main results: (i) partial liberalisation allows the USP to break-even, (ii) the optimal degree of liberalisation is always strictly in between zero and one: partial liberalisation maximises total welfare, and thus does better than either monopoly or full liberalisation;⁶ (iii) although total welfare increases with partial liberalisation (compared to the monopoly situation), consumers surplus is lower: all the gains from liberalisation are captured by postal entrants in the form of profits, and both types of consumers (households and firms) lose from the liberalisation process. We then study the optimal mix of a reserved area and of a compensation fund, and we obtain qualitatively similar results, with the exception of one case (reserved area coupled with a large excise tax) where business senders of mail benefit from liberalisation, but household consumers' surplus decreasing.

Finally, we study the robustness of our results to various assumptions. We first introduce fixed costs for the entrants (as well as for the USP), and then study the impact of assuming a competitive fringe (i.e., marginal cost pricing) of entrants. In both cases, we obtain that no amount of liberalisation, however small, can increase total welfare. In the case of entrants' fixed costs, they either prevent entry, or lower so much total welfare in case of profitable entry that it is socially better to prevent entry from occurring. In the case of a competitive fringe, the gains by mail business senders are not large enough to compensate for larger losses by the USP, resulting in lower aggregate welfare. We then study the impact of different efficiency levels, starting with the entrants. If they are assumed to be more efficient than the USP (entrants' marginal costs set at one half of USP's), then partial liberalisation remains welfare maximising, but all the gains from liberalisation accrue to the postal entrants in the form of large profits, and (firms and household) senders of mail end up worse off than under monopoly.

An important argument often heard in favour of liberalisation is that it would give incentives to the USP to lower its costs. We then study by how much the USP should decrease its costs, after liberalisation, for the senders of mail not to lose from this liberalisation. We do this by assuming no dynamic benefits from liberalisation, assessing the static losses and cost duplication, and then calculating the level of dynamic benefits needed to offset those losses and inefficiencies. The answer depends on whether only marginal costs are reduced, or both variable and fixed costs. If only marginal costs are affected, they would need to decrease by around two-thirds (depending on the specific scenario studied) for consumers not to lose from liberalisation. If both variable and fixed costs were affected, they would both need to decrease by almost a third for the mail senders not to be worse off after liberalisation.

⁶ This is due to the joint assumption of the absence of fixed costs for entrants and the preference of consumers for variety (i.e., the goods offered by postal competitors are imperfect substitutes).

SUMMARY – De Donder et al. (2001, 2002)⁷

In these models where entry is of the “end-to-end” variety and where the postal market is separated in 8 sub-markets according to the type of sender, of recipient, and the delivery area, we obtain that:

- **Pricing flexibility alone, or the setting of a compensation fund financed with taxes or excises, is not sufficient for the USP to break-even after full opening of the market to competition.**
- **A reserved area is needed for the USP to break-even.**
- **Partial liberalisation (i.e., some reserved area) maximises aggregate welfare, but both types of mail senders (firms and households) are worse off than under monopoly, and all the welfare gains from liberalisation accrue to the postal entrants.**
- **These results are robust to variations in the cost structure of the entrants, and to variations in their pricing behaviour.**
- **The USP would have to decrease its marginal costs by two thirds, or its marginal and fixed costs by one third, for the mail senders to start benefitting from the opening of the postal market to competition.**

3.2 Access pricing

These two early contributions assumed that entry took the form of end-to-end competition. In subsequent contributions, we improve upon this assumption and allow for entrants to either access the USP delivery network, or to bypass it and to compete end-to-end. We compute the socially optimal access charges that the USP should post, and their consequences on entrant behaviour (access or bypass) and on welfare.

⁷ As mentioned in the Introduction, we should stress that these results hold for the model considered and the calibration values used. Ultimately this is an empirical question. Nevertheless, the methodology developed in these papers establishes the potential for such outcomes to occur under "plausible" conditions. It also provides various qualitative insights. A similar caveat applies to all summary boxes.

In De Donder et al. (2003), we model competition between a USP and a competitive fringe of entrants. There are two delivery zones (urban and rural) and a representative sender of mail to both zones. The USP posts a uniform price. We first study the monopoly equilibrium, where the USP posts the lowest uniform price allowing it to break even. We then study the opening of the market to competition. The USP sets access charges (either differentiated according to the delivery zone or uniform) for access to its delivery network in each region. The entrant chooses whether to buy access (in the zones where the access charge is lower than its own delivery cost) or to bypass the USP's delivery network (where the access charge is higher than its own delivery cost). We compute the socially optimum access charge(s) in that case, and then resort to calibrations of the model.

We first compute analytically the optimal access charge, which is composed of three terms: the marginal cost of delivery, the opportunity cost for the USP of a displaced item, and a Ramsey term (inversely proportional to the demand price elasticity) to ensure that the USP breaks even. This optimal access charge does not look anything like a fully allocated cost, and the margin made on access varies across areas.

Comparing the monopoly case with the situation where there is only competition through access (i.e. where the entrant does not operate a direct delivery function and thus must use the USP's delivery network), we obtain that the optimal access charges allow the USP to break-even, and result in a larger consumer surplus, and thus larger welfare in society.⁸ Market liberalisation then clearly benefits society. In stark contrast, when allowing for bypass by the entrants, we obtain that the socially optimal access charge is lower than the entrant's marginal delivery cost in the rural area (resulting in rural access by the entrant) but higher than the entrant's delivery cost in the urban area (resulting in urban bypass). Under this configuration, the USP makes a loss (whatever the rural access charge, the USP fails to break even). Even if this loss were to be funded by a government transfer, total welfare would decrease after liberalisation, because the loss incurred by the USP is higher than the consumers' surplus gain.

These results are robust to the introduction of a uniform pricing constraint on the access charge (above and beyond the similar constraint on USP final price). We also study the robustness of these results to variations in the following two assumptions. A larger displacement ratio (meaning that, when the entrant sells mail, a larger proportion of this mail is displaced from the USP rather than a creation of volume) translates into a larger USP loss, and also a larger welfare loss (because, the larger the displacement ratio, the lower the consumer gain from having access to the entrant's product). A larger entrant's market share (for given retail prices) generates a larger USP loss but a smaller welfare loss after liberalisation (because the entrant's product is seen as more valuable by the consumers).

De Donder et al. (2005) builds on this model and adds two important elements. First, rather than assuming that the same uniform price is posted by the USP before and after the opening of

⁸ Once again, the joint assumption of the absence of fixed costs by the entrant, and the imperfect substitutability between postal products (so that new products offered by the entrants are not entirely displaced item from the USP) are crucial to this result.

the market to competition, we optimise the uniform price after liberalisation, at the same time as the access charges. Second, and more importantly, De Donder et al. (2005) expands the model to include Customer Direct Access. The objective is to study the impact of the European Union Directive of 2002, which imposes that access be offered not only to entrants, but also to customers. Note that this offering of access to customers is a very specific characteristic of the postal sector, unlike other network sectors such as energy or the telecoms.

We build on the same model as De Donder et al. (2003), but assume that there are two representative senders of mail to the urban area, large scale senders who can use CDA, and small scale senders who cannot (because their low volumes make this arrangement non-economic). We first introduce access for entrants but not for customers, without the availability of bypass. We obtain results very similar to De Donder et al. (2003): liberalisation leads to increases in consumers' welfare while allowing the USP to break-even. A higher entrant's market share and lower displacement ratio raise the total volume of mail delivered by the USP, decrease prices and increase welfare. Interestingly, the (optimised) retail price of the USP is lower after liberalisation than before, because optimal access charges are set above marginal cost, and thus allow funding of part of the fixed cost of operation. These results, obtained with differentiated access charges, are robust to the introduction of a uniform access pricing constraint when the uniform access price is set at its optimal level.

We then allow for bypass by entrants, without any CDA. As in De Donder et al. (2003), we obtain that entrants access the rural delivery network of the USP but bypass the USP in the urban area. Unlike in De Donder et al. (2003), the optimisation of the retail price of the USP allows it to break-even. At the same time, the loss of volumes to CDA in the urban area forces the USP to raise its retail price so much that volumes decrease further and consumer surpluses (and thus aggregate welfare as well) end up being lower after liberalisation than before. Liberalisation in this scenario is then a Pareto worsening move, where no one gains (postal operators barely break-even) while others (consumers) lose.

We finally introduce CDA and obtain that large mailers to the urban area benefit from the introduction of CDA, while all other consumers are worse off, because the loss of volumes to the USP forces it to raise its retail price. The USP breaks even provided that the displacement ratio is not too large. Even when it breaks even, aggregate welfare is lower than before the opening of the market to competition.

SUMMARY – De Donder et al. (2003, 2005)⁹

In these models where the USP competes with a competitive fringe of entrants, and offers access separately to two delivery zones, urban and rural, we obtain that:

- **When bypass is not available, the USP breaks even, consumer surplus and aggregate welfare increase (compared to the monopoly case).**
- **When bypass is allowed, it occurs in the urban area (while the entrant accesses the USP delivery network in the rural area). We then have that either the USP cannot break-even anymore, or that, if it can, consumers' surplus and welfare are lower than before liberalisation.**
- **The introduction of Customer Direct Access does not change the access pattern by postal entrants, benefits the large mailers to the urban area at the expense of all other consumers, and results in a lower aggregate welfare**
- **Increasing the displacement ratio between mail sold by the entrant and by the USP makes matters worse for both the USP and total welfare.**

3.3 Price controls

In De Donder et al. (2006a) & De Donder et al. (2006b), we study the impact of various price regulation formulas on welfare and volumes after the opening of the market to competition. In the previous contributions, we have assumed that the postal operator posted the so-called Ramsey prices, namely prices which maximise total welfare under the constraint that the USP breaks even. In reality, postal operators are often regulated via some form of price cap. The economics literature (Laffont and Tirole (2000)) has established that Ramsey prices can be decentralised with a suitable global price cap, where all products sold by the firm are put in the same basket, and where the weights given to the various products are proportional to the quantities sold of each item. This contrasts with the practice in many industries, where regulators use alternate formulations.

In De Donder et al. (2006a) & De Donder et al. (2006b), we study and compare a global price cap with two alternative formulations used in practice. The model assumes that the USP sells both

⁹ Analytical results together with some numerical simulations have been published in a peer-reviewed academic journal: see De Donder (2006)

single piece mail (which faces no competition) and bulk mail, which necessitates pre-sorting by the sender. USP bulk mail faces the competition of an imperfect substitute sold by an entrant behaving like a competitive fringe. As previously, we contrast the situation where the USP is a (regulated) monopolist with the equilibrium after opening of the (bulk mail) market to competition. Also, the USP operation generates both marginal and fixed costs (the latter representing non-modelled USOs) while there is no fixed cost for the entrant. Unlike previous papers, we assume a single delivery zone.

We contrast the allocation obtained with a global price cap (generating the Ramsey prices) with two other price regulations: the minimisation of the single-piece price (an extreme view of the “affordable pricing” constraint for that good), subject to the USP breaking even, and the allocation of the fixed cost between the two products sold by the USP according to an equi-proportional mark-up (EPMU) rule. We first show that, among the three procedures studied, the global price cap produces the largest volumes and hence the largest total use of the (delivery) network, the lowest average price and the largest welfare level. With the calibration studied, aggregate welfare decreases with liberalisation even when the global price cap is used (because the displacement of bulk mail volumes by the entrant increases average USP costs, and thus its break-even prices, whatever the specific pricing rule used). Moreover, if the extent of entry is large enough, the EPMU rule is too constraining and does not allow the USP to break even. More generally, as the extent of entry increases, the welfare-maximising prices increase, and aggregate welfare decreases.

In De Donder et al. (2006b), we build on the same model but introduce two delivery zones (urban and rural) and allow entry on each zone to occur either via bypass or access to the USP delivery zone. This increases the number of prices set by the USP (a uniform price for single-piece mail, reflecting USOs, and a retail and access price for bulk mail on each of the two delivery zone, for a total of 5 different prices). As in De Donder et al. (2002), we start with the situation where entry can occur only with access (bypass is not available), and we obtain at equilibrium large volumes of access in the urban market. With a global price cap, aggregate welfare is higher than before liberalisation. This is no longer the case with EPMU, although EPMU allows the USP to break even. Because large volumes are lost by the USP to the entrants (through access), the minimum single-piece price compatible with the USP breaking even increases when the market is opened to (access) competition. Finally, we study how the regulator can impose a minimum margin constraint (between bulk mail retail price and access charge, on each delivery market) and we measure the trade-offs generated by this instrument: as the margin is raised, increasing the USP retail bulk mail price and decreasing its access charge, the amount of entry increases, and the single-piece mail price decreases (up to a point), but aggregate welfare decreases. This illustrates the trade-offs between the different objectives set to a regulator (allocative efficiency, affordability, and extent of competition).

These trade-offs become even more pronounced when bypass is available. As in De Donder et al. (2002), bypass occurs in the urban area, while access is requested in the rural area. The

minimum single piece price compatible with the USP breaking even is much higher than when bypass is unavailable, aggregate welfare with a global price cap is lower than under monopoly, and no EPMU rule allows the USP to break even. Looking at the EPMU rule which minimises the USP loss, and funding this loss with either public transfers or with an output tax on the postal market, we obtain that welfare is higher with the output tax, but that the extent of entry is lower.

SUMMARY – De Donder at al. (2006a) & De Donder at al. (2006b)¹⁰

In these models where the USP sells a single-piece mail and faces competition from an entrant behaving like a competitive fringe in the provision of bulk mail, we obtain that

- **When entry is assumed to be of the end-to-end form (no access technology modelled), the opening of the market to competition decreases welfare, especially if non-optimal price setting procedures are used and if the extent of entry is large. Some procedures like EPMU do not allow the USP to break-even when the extent of entry is large enough.**
- **When access is the only technology available for entry, welfare increases with liberalisation if a global price cap is used, but not with an EPMU regulation. The minimum single-piece price allowing the USP to break-even (reflecting the objective of price affordability) increases. The regulator faces trade-offs between objectives when setting a minimum margin constraint between bulk mail and access price: as the margin is raised, we observe more entry and a smaller single-piece price, at the expense of aggregate welfare.**
- **When both access and bypass are available, bypass occurs in the urban delivery area, and access in the rural area. The trade-offs faced by the regulator are more pronounced: welfare is lower than before liberalisation even with the global price cap, there is no EPMU allowing the USP to break-even, and the minimum single-piece price compatible with the USP breaking even is much higher.**

¹⁰ Analytical results together with some numerical simulations have been published in a peer-reviewed academic journal: see De Donder et al. (2008a)

3.4 Unfair financial burden, net cost of USO, and changes in the specifications of the USO

The third European Directive on the postal sector adopted in 2008 introduces the terms of “unfair financial burden” and of “net cost of the USO”. In De Donder et al. (2010), we study both concepts in a model similar to De Donder et al. (2006b), where the USP has a de facto monopoly over single piece mail, but competes with a competitive fringe of entrants in offering bulk mail. Entry occurs exclusively through access to the USP delivery network, and we model two delivery areas: urban and rural. The USOs have several components: (i) the single piece price has to be the same on both (urban and rural) markets, (ii) all prices follow an EPMU rule, with the regulator setting a maximum mark-up value (75% of the marginal costs in our numerical computations), and (iii) all goods have to be provided with a minimum quality level (a short cut for minimum collection and delivery frequencies, minimum proportion of mail delivered the next day, etc.). The larger the quality level, the larger the demand by consumers, but the larger the variable and fixed costs for the USP.¹¹

The unfair financial burden is defined as the loss made by the USP when it is constrained in the three ways explained above, in a market opened to competition. Since, under the calibration assumptions developed up to now, the introduction of access-only competition does not generate a loss for the USP, we assume a decrease of 10% in market volumes, consistent with what had been observed in the market at that time. We then study how variations in the definition of the USOs impact this loss, with these profit variations representing the net cost of the USOs. The main variation studied is a relaxation of the minimum quality constraints. We consider two such variations: one which decreases demand by 1% and (variable and fixed) costs by 2%, and another decreasing demand by 5% and costs by 10%. We obtain qualitatively similar results with both variations.

If we allow the USP to keep its prices unchanged after the decrease in minimum quality, we obtain that consumer surpluses decrease, the USP loss decreases, while aggregate welfare increases (meaning that the gain for the USP is larger than the loss for consumers). If the decrease in quality is large enough, the net cost of USO is larger than the unfair burden, meaning that the USP can break-even. If the USP is forced to adjust its prices to its lower costs, according to the EPMU formula, after the decrease in quality, the picture is reversed: consumer surpluses increase by less than the increase in the USP loss, resulting in a decrease in aggregate welfare. The USP then cannot break even. Relaxing the maximum mark-up constraint (increasing it from 75% to 85%) allows increasing welfare and decreasing the USP loss, when it exists, including the unfair financial burden.

¹¹ The quality level of the entrant is assumed to be fixed.

SUMMARY – De Donder at al. (2010)

In a model where the USP sells single-piece mail and faces access-based competition from an entrant behaving like a competitive fringe in the provision of bulk mail, we obtain that

- **The net cost of the USO depends crucially on which dimensions of the USO are relaxed. There is no single cost of the USO.¹²**
- **There exists an unfair financial burden for the USP when volumes decrease by 10%, compared to the assumptions on which the previous papers are based.**
- **Within the confines of our calibration, we need a relaxation of both the minimum quality requirements and of pricing constraints for the net cost to exceed the financial burden, resulting in financially viable USOs.**

3.5 Pricing, Welfare and Organisational Constraints

With the ongoing liberalisation of the European sector, it has become increasingly clear that, as in other regulated network industries, the organisational structure of the USP may come under regulatory review. We study the impact of organisational structures and of USOs on pricing and welfare in De Donder at al. (2008b) & De Donder at al. (2013).

In De Donder at al. (2008b), we model a postal sector composed of two postal operators: a Retail Business (RB) and an entrant behaving like a competitive fringe. The RB offers two products (single-piece mail and bulk mail) to two delivery areas (urban and rural). The RB has a de facto monopoly power on single-piece mail, but competes with the entrant which also offers bulk mail in the two delivery areas. Postal activities are segmented into upstream (collection, sorting, transportation) and downstream (delivery) services. The Mail Network Operator (MNO) sells upstream and downstream services to the RB, and downstream services to the entrants. Entrants choose whether they prefer using the downstream service of the MNO (i.e., access its delivery network) or compete end-to-end with the bulk mail business of the RB (i.e., bypass). The MNO faces both fixed costs and variable costs.

¹² This is a general statement, which does not depend on the calibration used.

We consider three scenarios. In the first one, the MNO and the RB belong to a single entity, the Postal Operator (PO), which maximises welfare subject to breaking-even. We contrast results when bypass is available and when it is not, and when prices are set according to a global price cap (Ramsey prices) and when they are set according to an EPMU rule. We obtain that EPMU prices do not result in a large welfare loss, compared to Ramsey prices, when bypass is not available. If bypass is available (so that it occurs in the urban area), the PO still breaks even with Ramsey prices, but with a much lower welfare level (and higher prices) when without bypass. No prices consistent with EPMU allow the PO to break-even.

In the second scenario, we add separate break-even constraints for the MNO and the RB parts of the PO. We show that, by the use of internal transfer prices, the PO can attain the same equilibrium as in the first case, so that the two separate break-even constraints are not binding. To make these constraints binding, we add additional pricing constraints, namely that the MNO has to post prices following the EPMU rule. We study how prices, extent of entry and welfare are affected by variations in the mark-up posted by the MNO, both under access-only entry and when bypass is available. A striking result is that no sets of prices allow both the MNO and the RB to break-even when bypass is available.

In the third case, MNO and RB are separated. They both have to break-even, and the RB sets prices to maximise its profit, with the SP price being regulated by a price cap. We consider both the situation where the RB sells both single-piece mail and bulk mail, and where the RB sells only bulk mail, with single-piece mail sold by the MNO. Both situations give similar outcomes when bypass is not available. When bypass is available (and occurs in the urban area), the situation where the MNO provides SP mail is conducive to higher welfare outcomes than when the RB sells the good (because of the impacts on the two separate budget constraints). To allow both MNO and RB to break-even, the regulator has to set a high price cap on SP mail, resulting in a much lower welfare level than when bypass is not available.

The main conclusion is that it is objectives and constraints that primarily determine outcomes with regard to pricing and associated economic welfare rather than the organisational structure of whether the MNO and RB are in the same company or not, except when a GPC is not set optimally across all end-to-end prices and instead a price cap is set only for the single-piece price.

De Donder et al. (2013) builds upon De Donder et al. (2006a) & De Donder et al. (2008b) but assumes that SP mail is constituted of both social mail and of business mail. The MNO has a monopoly over the selling of SP social mail, while the RB competes with a competitive fringe of entrants when selling both SP business mail and bulk mail. The MNO sells access to the single delivery zone to both the MNO and to entrants for the selling of the (SP and BM) business mail. Bypass is not available to the entrants. Both the MNO and the RB maximise welfare subject to breaking even. Entrants post a mark-up over their marginal costs. This mark-up is exogenous and seen as reflective of the degree of competition on the market.

Results are contrasted according to whether the MNO can distinguish SP business and BM items for pricing, or not. Intuitively, welfare results are better when the MNO can post differentiated prices, but not by much. The most significant result here is rather that the BM access price is higher and therefore the contribution from BM greater when the MNO cannot distinguish SP business and BM items for pricing.

The access prices charged by the MNO to entrants rise as competition intensifies (so that the mark-up on entrants' marginal costs falls). As the contribution to fixed network costs made by the RB reduces, the USP also relies more heavily on recovering its fixed costs from both SP and BM business markets. The paper also demonstrates that if higher contributions to the fixed upstream costs are imposed on the RB (either internally or externally), the USP finds it more difficult to break even and further there is a limit to the contribution that the RB can make. The imposition of additional constraints upon the RB is neither beneficial to the USP nor to overall welfare and is also unnecessary for competition to have a high market share.

SUMMARY – De Donder at al. (2008b) & De Donder at al. (2013)

In a model where the incumbent postal operator is separated between a Mail Network Operator and a Retail Business which competes with entrants for the provision of bulk mail, we obtain that

- **Imposing separate profit constraints on the MNO and the RB (rather than a single profitability constraint on PO) need not affect results, unless specific constraints (such as EPMU pricing) is imposed on prices charged by the MNO to the RB**
- .
- **The organisational structure between MNO and RB matters especially when regulation is non-optimal. In that case, it may make a material difference whether SP mail is sold by the MNO or by the RB.**
- **The imposition of additional constraints upon the RB is neither beneficial to the USP nor to overall welfare and is also unnecessary for competition to have a high market share.**

3.6 Electronic competition in the communications market

In De Donder at al. (20011a) & De Donder at al. (2012), we study the pricing and welfare implications of electronic competition for some type of bulk mail. In De Donder at al. (2011a), we assume that the USP is the only provider of SP mail, but faces competition when providing two types of bulk mail: non direct (or transactional) mail (NDM) and direct (or advertising) mail (DM).

Both types of BM are also provided by entrants, via access to the USP's delivery network (we don't allow for bypass). Additionally, DM faces the competition of an electronic substitute.

We consider three cases. In all cases, the USP sets prices in order to maximise welfare subject to breaking even. In the first case, the USP has a (de facto) monopoly on the three types of mail (SP, DM and NDM). We contrast results according to whether the USP can post differentiated prices for the two types of BM. Differentiated prices are lower for DM than for NDM, because we assume (as is well established in the literature on the demand for mail) that the demand for the former is more sensitive to prices (price elastic in economists' jargon) than the latter. The SP price is lower when BM prices are differentiated, and volumes and welfare are larger.

In the second case, we introduce the alternative media competition for DM. With uniform DM and NDM prices, the USP has to increase its single piece price by 10% to break-even, resulting in lower volumes delivered by the USP, as well as lower consumer surplus and aggregate welfare (compared to the situation when the alternative medium is absent). The increase in the single piece price is smaller with price differentiation, so that welfare actually increases (compared to the situation when the alternative medium is absent). It is then welfare enhancing for the USP to respond to competition from the alternative medium, by differentiating its prices and not keeping them uniform.

In the third case, the USP also faces competition from postal entrants in both BM markets. The introduction of competition by postal entrants to the USP results in market share losses to the entrant. The loss in end-to-end volume and revenue for the USP is largely offset by revenue recovered through the access price and through marginal end-to-end price increases. This occurs in both cases with uniform and differentiated DM and NDM prices. Hence the postal entrant does not materially change the results and observations obtained in the absence of the entrant where delivery of its product is through access to the USP's downstream network.

We then study and compare the implications of uniform pricing constraints applied (or not) separately on access charges and on end-to-end prices. We obtain two main results. First, applying asymmetric constraints (i.e., a uniform pricing constraint on one set of prices –access or end-to-end- and not on the other, results in no entry taking place in the DM market. Second, the uniformity constraints imposed on end-to-end DM and NDM pricing largely determine the second-best access prices, with different prices for DM and NDM being welfare enhancing relative to when uniform prices apply.

De Donder at al. (2012) builds on De Donder at al. (2011a) but assumes that NDM also faces the competition of an alternative media. More precisely, NDM is transactional mail, and is sold by the USP to intermediaries or banks. These banks make use of this product to send information to their final clients. They also use alternative electronic media. Banks take the price set by the USP for NDM as an input price, and profit-maximise when setting the retail prices of paper and electronic

transactional media. The USP is setting welfare-maximising prices under the break-even constraint throughout the paper.

We start with the observation that, in the absence of electronic substitute for NDM (i.e., in the setting studied by De Donder et al. (2011a)), the NDM product makes the largest single contribution to break even for the USP, and this is also reflected in it providing the most significant contribution to net consumer surplus. Consequently, NDM features prominently in the welfare analysis and financial position of the USP.

We then introduce the electronic substitute to NDM, and we start by assuming that banks as well as the USP set welfare-maximising prices. We obtain that, although the USP has greater financial difficulties in the presence of the NDM medium alternative, break-even prices do exist, with both consumer surplus and welfare increasing in the presence of the NDM alternative medium. Also, the producer price for NDM exceeds that for DM, as was the case in De Donder et al (2011a). Indeed, the presence of competition from an alternative medium increases the price differential between NDM and DM for the USP.

When only the USP is subject to a break even constraint, the banks' activities might not be profitable at the welfare maximising prices. If the banks charge a resale price for paper statements equal to the producer price from the USP, then the banks might be profitable provided that the sale of their electronic statements is priced above its marginal cost. However, within our calibrations, it is welfare enhancing for the social planner to set consumer prices differing from producer prices and such that both the USP and banks breakeven. In this case the profits to the banks from the electronic statements subsidize a lower consumer price (stimulating growth) and a loss to the banks for paper statements.

We then model the competition between n banks as a Cournot game (where banks look to make statement information profit centres for their businesses, with each bank setting its volumes in order to maximise its profits, given what other banks are doing). In other words, banks profit maximise in setting their consumer prices in the NDM-transactional market with the social planner then setting other prices for postal products to maximise welfare. In the absence of any price cap on SP, the USP is able to break even, but with lower consumer surplus and welfare than before. In the presence of a price cap on SP, the USP is under greater financial pressure and not able to break even when the calibrations are amended to reflect a greater preference and market share for the electronic medium, while the banks make substantial profits from charging their customers for transactional services. In such circumstance, where banks charge their customers for transactional services and rely on the USP's network for provision of their mail services and there is a public policy objective to limit the price of SP, part of the banks' profit from transactional statements might be used to help fund the deficit to the USP.

SUMMARY – De Donder et al. (2011a)¹³ & De Donder et al. (2012)

In a model where banks have access to an electronic alternative to NDM for transactional purposes, we obtain that

- **The introduction of the alternative medium leads to a welfare reduction under the constraint of uniform DM and NDM prices, and a welfare increase when there is no such constraint. Hence, it is welfare enhancing for the USP to respond to competition from the alternative medium by differentiating its prices and not keeping them uniform, setting DM prices closer to marginal cost than NDM prices.**
- **The introduction of postal entrants does not materially change the results and observations obtained in the absence of the entrant where delivery of its product is through access to the USP's downstream network.**
- **There is merit in the case for the USP, and postal entrant, to differentiate its pricing for DM and NDM, in terms of its potential to increase total volume, reduce single-piece prices, enhance total welfare and better enable the USP to break even. These benefits need to be weighed against the costs of introducing such pricing, which would need to differentiate between the content and use of mail items between advertising and non-advertising.**
- **The introduction of an alternative medium for NDM, in addition to DM, has the potential to enhance welfare, if the USP and banks' profit centres relating to statements could be regulated to breakeven.**
- **Alternatively, if the banks profit maximise their profit centres for statements, then it might lead to increased financial pressure on the USP, and particularly so if there is either a binding price cap regulation on the USP or significant changes in customer behaviour in switching to an electronic medium. This could result in the USP being unable to breakeven at which point some other means of funding the universal service provision would need to be considered.**

¹³ Analytical results together with some numerical simulations have been published in a peer-reviewed academic journal: see De Donder et al. (2011b)

4. Conclusion

The first important and recurrent result that we obtain is the importance of the access versus bypass decisions when access prices are set optimally. We obtain in several papers presented above that, when bypass is not available, the opening of the market to competition generates a larger consumer surplus, larger aggregate welfare in the economy, with both the USP and the entrants being financial viable. In stark contrast, when bypass is available, it occurs selectively (in the urban but not in the rural area), which endangers the financial viability of the USP, increases its average costs and forces it to increase its (SP mail) price so much that consumers actually lose from the liberalisation of the market.

These results have been obtained under the assumption that liberalisation does not impact the efficiency of the USP, whose (fixed and variable) costs remain unchanged. Advocates of liberalisation often contend that a major reason to open a market to competition is to induce the incumbent to become more cost effective. It is difficult to model explicitly this phenomenon, but we have tried in De Donder et al. (2002) to measure by how much the USP costs would have to decrease for our conclusions to be modified, and we obtained large and potentially unrealistic amounts (around two thirds if only variable costs are impacted, and one third if both fixed and variable costs can be decreased). We should stress that these values depend on the precise calibration assumptions used, and we do not claim that they would apply to any specific market. This being acknowledged, the fact that these values are large is indicative that the calibration assumptions would have to be significantly changed to obtain values more in line with the cost decreases which could be expected to occur in a real market.

Another important conclusion of our research is that the type of price regulation matters a lot when assessing the welfare and pricing impacts of liberalisation. First, uniform pricing constraints (on direct as well as non direct mail, notably) are often very damaging not only to the USP and its ability to break-even, but also to consumer surplus and aggregate welfare. Second, the best results (in terms of volumes, welfare and the ability of the USP to break-even) are obtained when the USP is regulated with a global price cap—i.e. when all products offered by the USP are grouped into the same basket whose weighted average price is capped, with the weights given by the quantities sold of each good. All other pricing procedures studied (such as EPMU or the minimisation of the SP mail price under the condition that the USP breaks even) give worse results in terms of aggregate welfare, and also often in terms of volumes. Moreover, the use of non-optimal pricing regulations often results in the inability of the USP to break even, even under circumstances where break-even price configurations do exist. In other words, the trade-offs between financial viability of the USP

and liberalisation of the market are exacerbated when non-optimal price regulation formulas are used.

Finally, our work points to the necessity to rethink the extent of the USOs when opening the market to competition, and to simultaneously take into account the way the net cost of USO for the USP is funded. Optimal USOs should trade-off the benefits they generate with the additional costs they impose on the sector, which are mostly supported by the USP and by final consumers. Since these costs and benefits are not the same under monopoly and after opening the market to competitors, the optimal USOs are affected by the liberalisation of the market. For instance, geographical uniform pricing requirements become very difficult to sustain when entrants can pick and choose which markets to enter in, and whether to access or bypass the USP delivery network.

Glossary

BM: Bulk Mail

CDA: Customer Direct Access

DM: Direct (or transactional) Mail

EPMU: Equi-Proportional Mark-Up

GPC: Global Price Cap

MNO: Mail Network Operator

NDM: Non Direct (or advertising) Mail

PO: Postal Operator

RB: Retail Business

SP: Single-Piece

USO: Universal Service Obligations

References

1. Cazals C., JP Florens and S. Soteri, "Delivery Costs for Postal Services in the UK : Some Results on Scale Economies with Panel Data", chapter 10 of Regulatory and economic Challenges in the Postal and Delivery Sector, edited by M.A. Crew and P.R. Kleindorfer, Kluwer Academic Publishers, 2005.
2. De Donder Ph., Cremer H., Florens J.P., Grimaud A. and Rodriguez F., "Uniform Pricing and Postal Market Liberalisation", in Future Directions in Postal Reform, edited by M Crew and P Kleindorfer, Kluwer Academic Publishers, Boston, 2001, 141-163. Presented at the Rutgers Postal Conference held at Vancouver.
3. De Donder Ph., Cremer H. and Rodriguez F., "Funding the Universal Service Obligation under Liberalisation", in Postal and Delivery Services: Pricing, Productivity, Regulation and Strategy, edited by M. Crew and P. Kleindorfer, Kluwer Academic Publishers, Boston, 2002, 31-53. Presented at the Rutgers Postal Conference held at Sorrento.
4. De Donder Ph., Cremer H. and Rodriguez F., "Access Pricing and the Uniform Tariff in the Postal Sector", in Competitive Transformation of the Postal and Delivery Sector, edited by M. Crew and P. Kleindorfer, Kluwer Academic Publishers, Boston, 2003. Presented at the Rutgers Postal Conference held at Toledo.
5. De Donder Ph., Cremer H. and Rodriguez F., "Access Pricing in the Postal Sector: Results from a Model with Bypass and Customer Direct Access", in Regulatory and Economics Challenges in the Postal and Delivery Sector, edited by M.A. Crew and P.R. Kleindorfer, Boston: Kluwer Academic Publishers, 2005, 163-188. Presented at the Rutgers Postal Conference held at Cork.
6. De Donder Ph., "Access Pricing in the Postal Sector: Theory and Simulations", *Review of Industrial Organization*, 2006, 28-3: 307-326
7. De Donder Ph., Cremer H., Dudley P. and Rodriguez F., "Pricing and Welfare Implications of Alternative Approaches to Setting Price Controls in the Postal Sector", in Progress Toward Liberalisation of the Postal and Delivery Sector, edited by M.A. Crew and P.R. Kleindorfer, Springer, 2006a, 227-248. Presented at the Rutgers Postal Conference held at Antwerp.
8. De Donder Ph., Cremer H., Dudley P. and Rodriguez F., "A Welfare Analysis of Price Controls with End-to-End Mail and Access Services", Liberalisation of the Postal and Delivery Sector, edited by M.A. Crew and P.R. Kleindorfer, Cheltenham: Edward Edgar, 2006b, 53-72. Presented at the Rutgers Postal Conference held at Berne.
9. De Donder Ph., Cremer H., Dudley P. and Rodriguez F., "Price Controls in the Postal Sector: A Welfare Analysis of Alternative Control Structures", *Review of Network Economics*, 2008a.

10. De Donder Ph., Cremer H., Dudley P. and Rodriguez F., "Pricing, Welfare and Organisational Constraints for Postal Operators", Competition and Regulation in the Postal and Delivery Sector, edited by M.A. Crew and P.R. Kleindorfer, Cheltenham: Edward Edgar, 2008b, 150-166. Presented at the Rutgers Postal Conference held at Semmering.
11. De Donder Ph., Cremer H., Dudley P. and Rodriguez F., "Welfare and Profit Implications for Changes in Service Specifications within the Universal Service", Heightening Competition in the Postal and Delivery Sector, edited by M.A. Crew and P.R. Kleindorfer, Cheltenham: Edward Edgar, 2010, 161-180. Presented at the Rutgers Postal Conference held at Bordeaux.
12. De Donder Ph., Cremer H., Dudley P. and Rodriguez F., "Optimal Pricing for Mail and Welfare Implications in a Communications Market", Reinventing the Postal Sector in an Electronic Age, edited by M.A. Crew and P.R. Kleindorfer, Cheltenham: Edward Edgar, 2011a, 73-90. Presented at the Rutgers Postal Conference held at Porvoo.
13. De Donder Ph., Cremer H., Dudley P. and Rodriguez F., "Welfare and Pricing of Mail in a Communications Market", *Review of Network Economics*, 2011b, 10 (3).
14. De Donder Ph., Cremer H., Dudley P. and F. Rodriguez, "Optimal Pricing of Mail in the Transactional Market and Welfare for the Wider Communications Market", *Multi-Modal Competition and the Future of Mail*, edited by M.A. Crew and P.R. Kleindorfer, Cheltenham: Edward Edgar, 2012, 206-220. Presented at the Rutgers Postal Conference held at Jersey.
15. De Donder Ph., Cremer C., Dudley P. and F. Rodriguez, "Welfare and Pricing with Single-Piece and Bulk Mail Access Competition in the Postal Sector", Reforming the Postal Sector in the Face of Electronic Competition, edited by M.A. Crew and P.R. Kleindorfer, Cheltenham: Edward Edgar, 2013. Presented at the Rutgers Postal Conference held at Brighton.
16. Laffont J-J., and Tirole J., (2000), *Competition in Telecommunications*, Cambridge, MA: The MIT Press.