European Postal Operators' Diversification Strategies and Implications for Cost Allocation

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1 Introduction

As with other sectors of the economy, the postal sector is impacted by the digital revolution. During recent years, the postal sector has been characterized by two major opposing trends: the decline in letter post volume and the growth in e-commerce parcels volume. Many types of communication that were traditionally based on letter post have been digitalized. As a result, domestic letter volumes dropped in all European countries.

Even if letter post still plays an important role in the postal and express market, according to a study by Copenhagen Economics (2018), the growth in parcel and express segment does not outweigh letter revenue decline for most of postal operators in Europe. Therefore, postal operators are actively pursuing growth opportunities in new business areas in which economies of scope could be reached, mainly in logistics and freight, financial services, digital services and telecommunications, which are the largest sources of global postal revenues after traditional letter post and parcels and express delivery services. Postal operators also invest other markets such as local services or silver economy.

These diversification strategies may raise a competitive issue because postal operators (PO) will likely maintain significant market power in the declining letter post segment in contrast to their limited market shares in the parcel delivery market and in the new business segments they are investing. In this context, POs must be able to show that they are not distorting competition in a market by unduly abusing of their market power on the letter one despite the fact that this market is quickly

This paper represents the personal views of the author and should not be taken to represent the position of La Poste.

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disappearing and that the power postal operators could extract from it is theoretical, not to say fictional.

To prove they do not abuse of their market power by, for instance, cross-subsidizing new activities or activities in highly competitive markets by their historical, less competitive, activity of mail delivery, it is crucial to identify the costs for each activity. While some costs can be easily traced to individual product or line of business, there are important common costs, between historical and new activities, that need to be properly allocated between the different products sold by postal operators.

Accurate cost allocation principles serve multiple purposes: they divide joint costs to set tariffs to comply with competition law, but knowledge of costs is also a key to success and efficiency in new markets. The need to create value implies knowing the costs in order to optimize them and invest and innovate profitably.

Several cost methodologies are examined in this paper: notably methods based on game theory and methods based on the value of the activity. To our knowledge very few studies have analysed and compared all those different methods from an operational point of view. After this introduction, Section 2 performs a benchmark analysis of European postal operators' diversification strategies. Section 3 presents the different cost allocation methods that postal operators can use in order to allocate costs to their diversified product mix. Section 4 presents the advantages and disadvantages of the different cost allocation methods. Section 5 concludes.

2 Postal Operators' Diversification Strategies

2.1 Overview

Aggregate turnover of the 11 postal operators presented in Table 1 grew slowly between 2014 and 2018 (1.5% on average per year). By contrast, revenue of the giant e-commerce firm Amazon, which disrupted the parcel delivery market, grew on average by 27% over the same period (Amazon turnover has increased from 78 billion euros in 2014 to 204 billion euros in 2018[1]). Many European postal operators (Austrian Post, Post NL, Posten Norge, Posti, PostNord and Swiss Post) have seen their incomes decline during the 2014–2018 period.

In order to respond to the rapid evolution of consumer needs, European postal operators have embraced innovation and pursued growth opportunities in several business areas. They have chosen different models (Table 2).

Levels of diversification differ across operators. Copenhagen Economics (2018) conducted a survey on 32 European universal service providers showing that the share of total revenues collected outside the letter segment (including advertising mail) varies from 84% (Deutsche Post DHL) to 10% (Poczta Polska).

[1] Source: Amazon Financial Statements

Table 1 Evolution of revenue of postal operators between 2014 and 2018

M€	2014	2015	2016	2017	2018	CAGR
Austrian Post	2364	2402	2031	1939	1959	−4.6%
Bpost	2465	2408	2425	3024	3850	11.8%
CTT	719	727	697	714	717	0.0%
Deutsche Post DHL	56,630	59,230	57,334	60,444	61,550	2.1%
Gruppo Poste Italiane	10,553	11,056	10,643	10,629	10,864	0.7%
Le Groupe La Poste	22,163	23,045	23,294	24,110	24,699	2.7%
Posti	1859	1649	1608	1647	1610	−3.5%
PostNord	3886	3828	3743	3600	3664	−1.5%
Posten Norge	2450	2517	2487	2478	2399	−0.5%
PostNL	4251	3461	3413	3495	2772	−10.1%
Royal Mail	10,364	10,279	10,862	11,302	11,757	3.2%
Swiss Post	7441	7310	7278	7168	6836	−2.1%
Total	125,144	127,912	125,815	130,550	132,678	1.5%

Source: Author's calculations based on operators' financial reports

Table 2 Diversification of revenue among postal operators (2018)

	Mail and associated services	Media and advertising	Digital, local services and other products	Financial services	Parcel, packets and eCommerce	Express	Logistics
Austrian Post	41%	26%	5%		28%		
Bpost	35%	6%	13%	4%	13%		28%
CTT	71%			9%	20%		
Deutsche Post DHL	15%				14%	26%	45%
Gruppo Poste Italiane	23%	1%	5%	64%	7%		
Le Groupe La Poste	31%	6%	3%	22%	8%	30%	
Posten Norge	30%				33%		37%
Posti	48%			4%	18%		4%
PostNL	51%		2%		47%		
PostNord	45%				55%		
Royal Mail	28%	10%			35%	27%	
Swiss Post	34%		24%	25%	17%		

Source: Author's calculations based on operators' financial reports

2.2 Telecommunications Services

Several postal operators use their post office networks also to commercialize telecommunications services. In 2007 Gruppo Poste Italiane launched a mobile virtual network operator, PosteMobile, in order to provide mobile phone services. Providing telecommunications services in their post office network allows operators to benefit from scope economies. In 2011, Le Groupe La Poste joined forces with the French telecommunications operator SFR in order to create La Poste Mobile, a joint venture between the two companies. La Poste Mobile offers telecommunication and Internet services thanks to the network of SFR. In the same way, Austrian Post has a service branch that provides telecommunications contracts and products for its business partner A1 Telekom Austria AG.

2.3 Digital Services (E-Government Services, Dematerialized Solutions, Hybrid Mail and Virtual Mail)

In 2018, hybrid mail was offered by 23 of the 30 postal operators responding to the survey of Copenhagen Economics.[2] Poste Italiane provides mail digital services such as hybrid mail and digital collection of registered letters (when letters cannot be delivered due to the absence of the addressee, the latter can collect the registered letter through digital identification).

La Poste offers several digital services, including secure and dematerialized solutions, through its subsidiary DOCAPOST. La Poste provides a service called Digiposte which offers a certified digital identity tool and an electronic safe to store pay slips, tax forms and other important documents. This service can be accessed through an online application certified as secure, encrypted and with the users' personal data hosted in France. La Poste has also launched a dedicated business online services platform, offering electronic administrative services such as e-signature, e-invoices and archiving. La Poste's mobile app also includes the possibility to have a webmail address and to send and receive e-registered letters (Alloo 2018). In 2018, digital services turnover represents 2.2% of the total turnover of Le Groupe La Poste.

PostNord is restructuring its business to focus more on digital communication, combining physical and digital products and services. PostNord offers a secure electronic mailbox service, E-Boks, used by citizens to communicate with public authorities. Bpost subsidiary Speos manages outgoing financial and administrative document flows, such as invoices, bank statements and pay slips. The services offered include document generation, printing and enclosing, electronic distribution

[2] Hybrid mail refers to items that are dispatched in electronic form by the sender and are subsequently printed, packed, sorted and delivered by the postal operator to the recipient. Virtual mail refers to the digitalization (scanning) by the postal operator of a paper-based item dispatched by the sender and its electronic delivery of the item to the recipient (source: Copenhagen Economics (2018)).

and archiving. In addition, bpost's Certipost service provides document security, digital certification and Belgian e-ID activities (Alloo 2018).

E-government services in 2018 was provided by 15 of the 30 postal operators responding to the survey of Copenhagen Economics. Poste Italiane strives to become the key service provider for the public sector in Italy thanks to the digitalization of access to the public sector and digital identification. In Spain, Correos provides a range of digital services and has a network of post offices which can securely verify individuals' identity when required for certain digital transactions or to provide e-Government services.

2.4 Financial Services

Financial services in 2018 were offered by 25 of the 30 postal operators responding to the survey of Copenhagen Economics, e.g. bpost, CTT, Poste Italiane, Le Groupe La Poste, Poczta Polska, Posten Norge and Swiss Post. However, revenue shares of postal financial services vary widely among these postal operators. In 2018, financial services represent respectively 25% and 64% of Swiss Post and Poste Italiane total revenue. The share of financial services in total turnover is lower than 25% for bpost, CTT, Le Groupe La Poste and Posti.

Gruppo Poste Italiane uses the convergence of banking and telecom to provide several innovative financial and insurance digital services such as a payments portal for bills and dues owing to enterprises and the public sector. Poste Italiane is also developing new service models for home insurance and third-party liability car insurance thanks to the Internet of Things. Poste Italiane has elaborated several mobile apps that offer numerous features, including the ability to manage bank accounts, pay utility bills and transfer money. According to its own estimates, Poste Italiane holds 25% of the Italian market share in e-commerce payments. In Finland, Posti's subsidiary OpusCapita offers software solutions for sourcing, payment and cash management either by selling licenses or software as a service.

2.5 Parcel and Express Delivery Services

The continued move from offline to online shopping is leading to the rapid growth in e-commerce and creates new opportunities for postal operators to respond to and to minimise the negative impact of letter volume decline. Almost all European postal operators provide parcel express services. This is one of the main diversification strategies implemented by postal operators across Europe. According to Copenhagen Economics, the growth in parcel and express segment clearly does not outweigh letter revenue decline for most of postal operators in Europe. However, for few operators (Deutsche Post DHL, Le Groupe La Poste or Royal Mail), parcel and express delivery services revenues already exceed letter revenues (see Annex).

Many operators see a strong increase in the global cross-border e-commerce market.[3] National European postal operators like Deutsche Post DHL, Royal Mail, PostNL or Le Groupe La Poste (thanks to its subsidiary GeoPost) have expanded their business in the European parcels and express market through acquisition of established players of the market. Many other new operators also entered the parcels and express market in several European countries. All this has increased competition between incumbents and new entrants. As a result, the parcels market is becoming more and more competitive and fragmented in many countries such as Cyprus, Greece, Italy and Croatia, even if it remains concentrated in few other countries.[4]

2.6 Logistics and Freight

A good 80% of postal operators responding to the survey of Copenhagen Economics reported providing logistics and freight services. Main examples include Deutsche Post DHL, PostNord, Posten Norge and Posti. In 2018, Deutsche Post DHL logistics revenue represents 45% of the total group revenue. Deutsche Post DHL logistics revenue remained relatively stable for the past few years. Deutsche Post DHL states that it focuses upon market segments that offer higher margins and growth rates especially in the service logistics business. In 2018, Deutsche Post DHL logistics revenue fell slightly because Deutsche Post sold its subsidiary Williams Lea Tag to Advent International in 2017.[5]

Between 2017 and 2018, logistics services sales of the PostNord Group increased by 14 percent. In 2018, bpost acquired several logistics companies.[6] Bpost also manages the order, the stock, the packaging and the delivery of the licence plates in Belgium.

2.7 Local Services, Silver Economy and Circular Economy

Within its services mail and parcel division, Le Groupe La Poste sells several local services. La Poste implemented a recycling of office waste thanks to a joint venture with the company Suez. La Poste uses its network of postal service outlets to

[3] According to DHL analysis, cross border items are growing at about 20–25% each year.

[4] According to OFCOM, Royal Mail retains a very high share of single piece parcels weighing 2 kg or below. OFCOM estimates this was between 80% and 90% of both volumes and revenues in 2017/2018. The market share of DHL in the German parcel market is equal to 45.5% according to the company estimates. The German parcel market is nevertheless characterized by fierce price competition.

[5] Source: reuters.com

[6] In 2018, bpost acquired the companies Leen Menken Foodservice Logistics BV, IMEX Global Solutions, LLC, M.A.I.L., Inc., and Anthill BV.

conduct the highway code. Postmen can install at home electronic equipment and deliver shopping and meals.

La Poste offers the service "Veiller sur mes parents" for elderly persons which includes a 24 hours a day teleassistance and regular visits of postmen at home. In 2017, Le Groupe La Poste acquired Asten Santé a company that provides home care services. Between 2017 and 2018, sales of local services offered by La Poste have increased by 200%.

In the Netherlands, PostNL has expanded its range of services and now supplies pharmaceuticals, flowers, fresh food and bulky products (furniture, appliances) that it installs at home. In 2018 PostNL coinvested with Henkel, a chemical and consumer goods company, in Dobbi, an online laundry and dry cleaning service. Dobbi was recognised as the most innovative new business in its market and currently has a coverage of around 70% of the Netherlands. PostNL also coinvested in 2018 in Roamler Care, a home care platform that connects self-employed home care providers with sick or elderly people connected to care institutions. This is a business-to-business service that aims to improve matching, planning and administration between care institutions and home care providers.

Poste Italiane has elaborated a digital platform enabling users to assess their future pension position and build the return on their supplementary pension fund. Poste Italiane is also developing new service models for e-health.

3 How to Properly Allocate Costs of New Activities?

Properly estimating the incremental costs of new activities and allocating the common costs between new and historical activities are essential to allow postal operators to make efficient decisions in terms of pricing and to comply with competition law as well.

3.1 Some Costs and Regulation Concepts

A "cost object" is a managerial term for a product, process, department or customer from which some costs originate from it or are associated with it. In other words, they are costs that can be identified with and traced back to an originator.[7] Total cost refers to the total expense incurred in reaching a particular level of output; if total cost is divided by the quantity produced, average or unit cost is obtained. A portion of the total cost known as fixed cost—e.g. the costs of a building lease or of heavy

[7] Source: www.myaccountingcourse.com

machinery—does not vary with the quantity produced in the short run. Variable costs, like the costs of labour or raw materials, change with the level of output.[8]

Direct costs are expenses that a company can easily connect to a specific cost object, which may be a product, department or project. Indirect costs go beyond the expenses associated with creating a particular product to include the price of maintaining the entire company. These overhead costs are the ones left over after all direct costs have been computed.[9] Common costs are costs which are incurred for more than one product, job, territory or any other specific costing object.[10]

An aspect of cost particularly important in economic analysis is marginal cost, or the addition to the total cost resulting from the production of an additional unit of output.[11] Incremental cost refers to a discrete change instead of a marginal change. It could be in the volume of a particular product or a new product. It is similar to marginal cost, except that marginal cost refers to the cost of the next unit. Incremental cost might be the additional cost from the next 200 units.[12]

Fully distributed costs consist in allocating categories of costs, which can be directly or indirectly attributed to products. These categories of costs are direct volume-sensitive costs, or direct variable costs, direct fixed costs and a share of the joint and common costs. Stand-alone cost is a cost standard that measures the cost of providing a product or service by the operator in isolation from the other productive activities of the company (ERGP 2015).

The greater the difference between the incremental and the stand-alone costs, the greater the possibility of conflicts and disagreements on how to best allocate indirect costs (Oxera 2005).

On December 2008, the European Commission issued a Guidance paper on its enforcement priorities in applying Article 102 TFEU (then Article 82 EC) to abusive exclusionary conduct by dominant undertakings. In this Guidance paper, the Commission identifies two cost benchmarks that it is likely to use in determining whether a dominant firm's pricing should be regarded as exclusionary: average avoidable cost (AAC) and long-run average incremental cost (LRAIC).[13]

Average avoidable cost is the average of the costs that could have been avoided if the company had not produced a discrete amount of (extra) output. Long-run average incremental cost is the average of all the (labour and capital) costs that a company incurs to produce a particular product (OECD 2004).

According to the European Commission (2009), failure to cover AAC (black zone) indicates that the dominant undertaking is sacrificing profits in the short term and that an equally efficient competitor cannot serve the targeted customers without incurring a loss. If a dominant undertaking charges a price below AAC for all or part

[8] Source: universalium.academic.ru

[9] Source: businessnewsdaily.com

[10] Source: yourarticlelibrary.com

[11] Source: universalium.academic.ru

[12] Source: www.myaccountingcourse.com

[13] Temple Lang and Renda (2009)

of its output, it is not recovering the costs that could have been avoided by not producing that output: it is incurring a loss that could have been avoided. Pricing below AAC by a dominant company is in most cases viewed by the Commission as a predatory price.

LRAIC is usually above AAC because, in contrast to AAC (which only includes fixed costs if incurred during the period under examination), LRAIC includes product specific fixed costs made before the period in which the allegedly abusive conduct took place.[14] Failure to cover LRAIC indicates that the dominant undertaking is not recovering all the (attributable) fixed costs of producing the good or service in question and that an equally efficient competitor could be foreclosed from the market. Therefore, if the price covers AAC but does not cover LRAIC (grey zone), there is a risk that it would be considered as a predatory price by the competition authorities. If the effective price is between AAC and LRAIC, the Commission can carry out additional investigations to determine whether entry or expansion even by equally efficient competitors is likely to be affected or not.

3.2 Proportionality and Accounting Methods

Various proportionality methods are used to allocate overhead costs to units of production. Some methods consist of allocating all or part of the common costs according to a proportionality rule. The Equi-Proportionate Mark-Up (EPMU) is an approach sometimes used by regulated firms. With this quite simple approach, the mark-up for indirect costs is applied across all products based on the direct costs of each product. For example, if 50M€ of indirect costs has to be allocated across two products, with 40M€ and 60M€ of direct costs respectively, 20M€ would be allocated to the first product (i.e. 50M€∗40M€/(40M€ + 60M€)), and 30M€ to the other product (i.e. 50M€∗60M€/(40M€ + 60M€)). That is, an equal mark-up of 50% would apply to each product (Oxera 2005).

Other accounting methods use either input-based cost drivers (labour hours consumed in making the product, floor space used, etc.) or output indicators such as production volumes as allocation keys in order to allocate indirect costs.

Another widely used method, the Activity-Based Costing, or ABC system, is based on the analysis of specific costs related to every activity performed by a firm in the manufacturing of its products. Based on these activities, resources are allocated to various products, markets, etc.[15]

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[14] Average avoidable cost is the average of the variable and fixed costs that could have been avoided if the company had not produced a discrete amount of (extra) output. For a single-product company AAC and the average variable cost (AVC) will be the same, as it is only variable costs that can be avoided. For a multi-product company, AAC includes fixed costs incurred during the period of examination. Long-run average incremental cost is the average of all the (variable and fixed) costs that a company incurs to produce a particular product (European Commission (2009)).

[15] Source: www.myabcm.com

Under the ABC system, an activity can also be considered as any transaction or event that is a cost driver. A cost driver, also known as an activity driver, is used to refer to an allocation base. Examples of cost drivers include machine setups, maintenance requests, consumed power, purchase orders, quality inspections or production orders. There are two categories of activity measures: transaction drivers, which involves counting how many times an activity occurs, and duration drivers, which measure how long an activity takes to complete.[16]

Unlike traditional cost measurement systems that depend on volume count, such as machine hours and/or direct labour hours, to allocate indirect or overhead costs to products, the ABC system classifies five broad levels of activity that are, to a certain extent, unrelated to how many units are produced. These levels include batch-level activity, unit-level activity, customer-level activity, organization-sustaining activity and product-level activity.[17]

Activity-based costing expands the number of cost pools that can be used to assemble overhead costs. Instead of accumulating all costs in one company-wide pool, it pools costs by activity. ABC creates new bases for assigning overhead costs to items such that costs are allocated based on the activities that generate costs instead of on volume measures, such as machine hours or direct labour costs. ABC alters the nature of several indirect costs, making costs previously considered indirect—such as depreciation, inspection or power—traceable to certain activities.[18]

3.3 Methods Inspired by Cooperative Game Theory

The problem of the allocation of common costs can be seen as a cooperative game (a cost game). The entities of the set N are the players. By cooperating (forming coalitions, subsets S of N), they can reduce their total production costs. An important concept in the use of allocation methods inspired by cooperative game theory is that of the "core". The core is the set of feasible allocations that cannot be improved upon by a coalition of the economy's agents.

Among the proposed allocation rules by cooperative game theory, the most frequently used is the Shapley value (Shapley 1953). Shapley's idea is to look at the marginal value of all the coalitions of players that can be formed from the n players and to determine the value of a player from each of the coalitions. Shubik (1962) considered the Shapley value as a method of joint cost allocation. This method allows each player to assess a priori the benefits (in terms of cost reduction) he would reap if he decides to join the coalition. To show its application to the problem of assigning joint cost, let us suppose that the full cost of some common costs (e.g. finance, regulation or network costs) is shared among n products designed by

[16] Source: www.investopedia.com

[17] Source: www.investopedia.com

[18] Source: www.investopedia.com

$N = \{1, 2, \ldots, n\}$. The function $C(S)$ describes the net total cost of the coalition S when those products "cooperate". The Shapley value for product i is given by:

$$x_i = \sum_{S \cup N} \frac{(s-1)!(n-s)!}{n!}\left[C(S) - C(S \setminus \{i\})\right]$$

where s is the number of products in the coalition S and n is the total number of products. The Shapley value can be computed by calculating the average marginal cost which product i brings to a coalition under the assumption that coalitions are formed randomly. Thus there are $(s - 1)\,!\,(n - s)!$ orderings of the products, such as product i comes after all the other products in a given coalition S (which contains i), but before any product which is not in the coalition S. The incremental cost of product i is $C(S) - C(S\backslash\{i\})$.

There are also variants or extensions of the Shapley method. The nucleolus measures the attitude of a coalition towards a proposed allocation by the difference between the cost it can secure and the proposed cost (Lemaire 1984). This allocation rule is not additive, unlike the Shapley value, but always selects a core application when it is not empty. The nucleolus, part of the core, is immune to threats of withdrawal.

Owen (1977) defined the Shapley value of a game with a priori unions and created an allocation rule known as the Owen value. Owen takes into account the possibility that some players because of their political or economic affinities may act together more often than others. In this case, the unions play a game among themselves, called the quotient game, and after that the players in each union play an internal game. In the Owen value, the payoffs for the unions in the quotient game and the payoffs for the players inside the union are given by the Shapley value (Lorenzo-Freire 2017).

The equal allocation of non-separable costs rule is based on the marginal contribution of the agents to the grand coalition, also called the separable costs. The non-separable costs are what remains of the cost incurred by the grand coalition after deleting the sum of these marginal contributions. The equal allocation of non-separable costs first assigns to each agent his/her separable cost and then equally splits the non-separable costs[19] (Béal et al. 2014).

3.4 Methods Based on the Value of the Activity

The idea of this approach is to bear a larger share of the common costs to activities for which demand is less elastic. In other words, more (less) costs are allocated to activities that are less (more) price sensitive. Ramsey pricing was applied by varying

[19] The equal allocation of non-separable costs rule neglects the contributions of players to the coalitions. However, this rule satisfies three axioms of the Shapley value (efficiency, symmetry and linearity).

the amount of common and fixed costs allocated to user type based on the likely impact of such a cost change on user behaviour. Ramsey pricing techniques have been used to assign fixed and common costs in large networks, such as electrical utilities, telecommunications, etc. (Fiertz and Monico 1998).

4 Advantages and Disadvantages of the Different Methods

Frisk et al. (2010) examine cost allocation between eight forest companies in Sweden using data taken from a case study done by the Forestry Research Institute of Sweden. When forest companies collaborate, they benefit from cost savings. These authors compare the cost allocation results of different methods (the Shapley value, nucleolus, non-separable costs and volume weights). The simplest solution for the forest companies would be to split the common cost equally among the participants based on volumes. However, this cost allocation is not to be considered as fair; some participants pay more with this allocation than with the Shapley value, the nucleolus or the allocation of non-separable costs. The concepts based on Shapley, nucleolus and non-separable costs provide stable cost allocations and are interesting as a basis for splitting costs.

Owen (1982) analyses the fees policy of the Birmingham airport between 1968 and 1969. He shows that the allocation of the common costs of landing fees used by the Birmingham airport resulted in large aircraft being subsidized by small aircraft over what would have been prescribed by the nucleolus and the Shapley value.

Cost allocation rules can be used for different goals (pricing, competition law analysis, net cost calculation, etc.). Proportional cost allocation methods have the advantage of simplicity and are easy to implement. The simplest proportional cost allocation method is EPMU. The ABC method produces a more accurate picture of the distribution of the costs than the EPMU method. However, the ABC method tends to transfer overhead costs from high-volume products to low-volume products, raising the unit cost of low-volume products.[20] In the postal sector, parcels tend to have higher cost than letters due to their handling characteristics (size, weight, etc.). The EPMU method tends to allocate more overhead costs to parcels instead of letters as parcels increase as a share of total traffic in postal networks.

Unlike approaches using value-based drivers, such as Ramsey pricing, proportional cost allocation methods neglect consumers' willingness to pay and in general demand-side factors. Firms wishing to use Ramsey pricing need to obtain reliable estimates of the elasticities of demand (Oxera 2005).

Proportional cost allocation methods and methods based on the value of the activity do not carry out the calculation of the whole combinatory between the various coalitions of entities (divisions or products of an enterprise, the partners of a project, etc.). With these methods, the share of common costs attributed to an

[20] Source: www.investopedia.com

activity does not take into account the common costs actually induced by that activity (in limit cases, stand-alone costs could be lower that fully distributed costs obtained with these methods).

Methods inspired by cooperative game theory present the advantage of generating a better distribution of economies of scope than proportional cost allocation methods and approaches using value-based drivers. The use of cooperative game theory rules such as the Shapley Value allows a more accurate regulatory compliance and even a stronger competitiveness in terms of pricing.

Methods inspired by cooperative game theory, however, are more complex to implement from an operational perspective. These methods require estimates of counterfactual scenarios for stand-alone costs and common costs shared by the different coalitions of products. A postal operator selling, for example, letters, parcels and a new product has to estimate the stand-alone costs of the three products and the common costs of letters and parcels, letters and the new product, parcels and the new product and the common cost of the three products. Therefore, firms wishing to use those methods need to invest in information technology and engineering.

To our knowledge, methods inspired by cooperative game theory have been very rarely used by firms.[21] However, in the future these methods might be more used thanks to technological progress.

5 Conclusion

For many European postal operators, the growth in parcel and express segment does not outweigh letter revenue decline. Postal operators are obliged to find new growth drivers. They are actively pursuing growth opportunities in new business areas, mainly in logistics and freight, financial services, digital services and telecommunications, which are the largest sources of global postal revenues after traditional letter post and parcels and express delivery services. Postal operators also invest in other markets such as local services or the silver economy.

Letters are declining because of the competition of electronic communications. The European parcels market is becoming more and more competitive. As a result, postal operators have now less market power than a few years ago. Even if postal operators have now less market power, diversification strategies raise competition issues. When diversifying or entering new markets, postal operators should firstly cover incremental costs. Determining incremental costs implies to establish adequate methods to allocate fixed and common costs in the case of multi-product firms. Allocating indirect costs such as overheads and network costs is not an easy task.

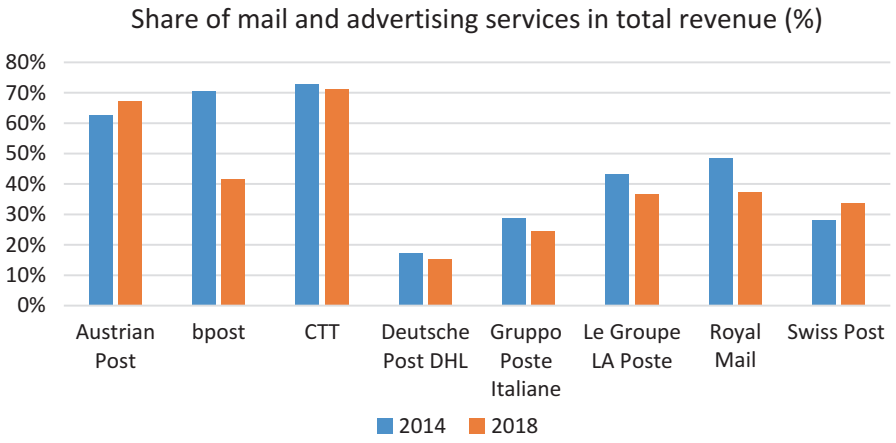
[21] Long-distance telephone call pricing proposed by Billera et al. (1978) was adopted by Cornell University. A community of 18 Swedish agglomerations used the Shapley value to spread the increase in water supply costs. Aadland and Kolpin (1998) show that Shapley value is sometimes used to share the costs of cleaning irrigation channels for ranch groups in the United States.

Choosing an adequate cost allocation method will enable firms to make efficient decisions in terms of pricing, product mixes, outsourcing or internal development, research and development investments, automation, marketing, campaigns, etc..[22] The different methods presented in this paper have each specific advantages and drawbacks. Proportional cost allocation methods have the advantage of being simple to use. Methods based on the value of the activity allocate more costs to activities that are less price sensitive. Methods based on game theory are more difficult to apply in practice, but they give more accurate results.

On the basis of my analyses, I recommend to use methods inspired by cooperative game theory, such as the Shapley value, anytime operators are able to reasonably estimate counterfactual scenarios for stand-alone costs and common costs shared by the different coalitions of all the products they sell.

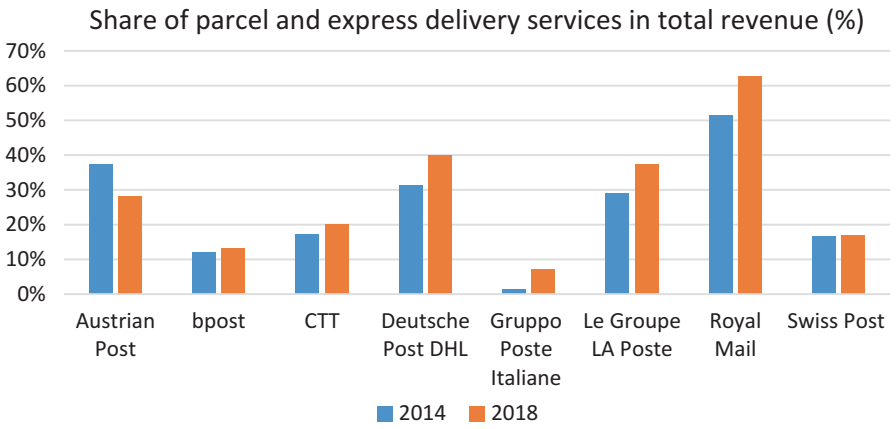
If it is too complicated to estimate counterfactual scenarios for stand-alone costs and common costs, it seems advisable to use the ABC method rather than EPMU. A further option is to use methods based on the value of the activity in order to take into account demand-side factors. But this solution can be adopted only if reliable estimates of the elasticities of demand are available.

Annex



Source: author's calculations based on operators' financial reports

[22] Source: www.myabcm.com



Source: author's calculations based on operators' financial reports

References

Aadland, D., & Kolpin, V. (1998). Shared irrigation costs: An empirical and axiomatic analysis. *Mathematical Social Sciences, 35*(2), 203–218.

Alloo, V. (2018). Postal industry diversification: Exploring new worlds and facing new regulations. In P. L. Parcu, T. Brenan, & V. Glass (Eds.), *New business and regulatory strategies in the postal sector*. Cham: Springer.

Béal, S., Deschamps, M., & Solal, P. (2014). *Balanced collective contributions, the equal allocation of non-separable costs and application to data sharing games*. Working Papers 2014-02, CRESE.

Billera, L. J., Heath, D. C., & Raanan, J. (1978). Internal telephone billing rates — A novel application of non-atomic game theory. *Operations Research, 26*, 956–965.

Communication from the European Commission. Guidance on its enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings. OJ C 45, 24.2.2009, p. 7–20.

Copenhagen Economics. (2018). *Main Developments in the Postal Sector (2013–2016)*. Study for the European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs.

ERGP. (2015). (12) 28 Rev. 1. Common position on cost allocation rules, Ref. Ares 5491994. 01/12/2015.

Fiertz, R., & Monico, C. (1998). *Cost Allocation Paper*. United States Department of Transportation, National Transportation Library's Repository and Open Science Access Portal.

Frisk, M., Göthe-Lundgren, M., Jörnsten, K., & Rönnqvist, M. (2010). Cost allocation in collaborative forest transportation. *European Journal of Operational Research, 205*(2), 448–458.

Lemaire, J. (1984). An application of game theory: Cost allocation. *ASTIN Bulletin: The Journal of the International Actuarial Association, 14*(01), 61–81.

Lorenzo-Freire, S. (2017). New characterizations of the Owen and Banzhaf–Owen values using the intracoalitional balanced contributions property. *TOP, 25*(3), 579–600.

OECD. (2004). *Predatory Pricing – Issue for a balanced and practical enforcement policy – Roundtable discussion on predatory foreclosure*. Note by the European Commission.

Owen, G. (1977). Values of games with a priori unions. In O. Moeschlin & R. Hein (Eds.), *Mathematical economics and game theory: Essays in honor of Oskar Morgenstern*. New York: Springer.

Owen, G. (1982). *Game theory*. San Diego, CA: Academic Press.

Oxera. (2005). *One size fits all? Cost allocation in postal services*. August 2005.

Shapley, L. S. (1953). A value for n-person games. In H. W. Kuhn & A. W. Tucker (Eds.), *Contribution to the theory of games vol. II, annals of mathematics studies 28*. Princeton: Princeton University Press.

Shubik, M. (1962). Incentives, decentralized control, the assignment of joint costs and internal pricing. *Management Science, 8*, 325–343.

Temple Lang, J., & Renda, A. (2009). *Treatment of exclusionary abuses under article 82 of the EC treaty – Comments on the European Commission's guidance paper*. Brussels: Centre for European Policy Studies.