

A Demand System Approach to Affordability

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1 Introduction

Postal Universal Service Providers and traditional mail carriers continue to face the dual challenge of falling demand and traditional regulation. Between 2007 and 2011, mail volumes fell by an average of 15 % across Europe, falling by 3.2 % per year in Ireland and 6.4 % per year in the UK. As certain services fall under the Universal Service Obligation (USO), Universal Service Providers (USPs) are obliged to continue to offer these services. In order to finance the USO, USPs often seek to increase prices on certain products. This has been the case in the postal sector; for example, An Post increased the tariff on letters up to 50 g by 5 cent in 2013, while Royal Mail increased the tariff on the same product by 2p to 3p in 2014. As USO products, these price changes must be approved by the regulator.

Postal regulations typically include provisions for flexibility in pricing behaviour but also require that price increases be 'affordable.' For example, in Ireland the 2011 Postal Act requires postal prices to be affordable and orientated to cost (ComReg 2013). Similarly, the European Postal Directive (97/67/CE) requires that postal prices be 'affordable.'

Despite its seemingly intuitive meaning, economists, regulators and postal operators have struggled to define affordability, as there is no universally accepted definition in the postal sector or in economics generally. This paper attempts to address the definition of affordability in a more economically rigorous manner by examining the response of lower income groups to a number of hypothetical postal price increases. We use data from the Survey on Income and Living Conditions

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(SILC) and the Household Budget Survey (HBS) in Ireland. We focus specifically on household consumers' expenditures on postal products and define a lower income group as being in the first decile of disposable income such that savings and net worth are low or near zero.

It is important to distinguish an income group for which affordability is most likely to be an issue, as examining the whole population including individuals in higher income deciles could cloud any conclusions on affordability for the more vulnerable segments of postal users.¹

To assess whether prices are affordable, we define affordability with respect to price changes, where a price increase will engender affordability issues to the extent that substitution is not possible. Broadly, we propose that an appropriate measure of affordability should recognise that affordability could provoke either a reduction in demand of the own product due to the income elasticity of demand or a reduction in other necessities such as food or heating. We thus assert that a good is unaffordable if an increase in its price leads a consumer to either significantly reduce consumption of the own good in question or to forego a necessity good or a bundle of necessity goods.

We apply the proportionality calibrated almost ideal demand system (PCAIDS) method to estimate a set of demand elasticity parameters for postal products, food and related telecommunications products. The PCAIDS model is based on the same principles as the linear-approximate demand model (LA-AIDS) model, but requires less information and estimates cross-price estimates based on an analytical formula. This formula is derived from and endogenous to observed market shares, the own-price elasticity of one product in the market and an aggregate price elasticity of the industry.

The remainder of the chapter proceeds as follows: Sect. 2 reviews some of the relevant literature on affordability in the postal sector. Section 3 outlines the dataset used and the empirical method. Section 4 presents the results of estimating a PCAIDS model for examining affordability and Sect. 5 concludes with some directions for further research.

2 Background and Literature

2.1 Defining 'Affordability'

Article 12 of the European Directive (97/67/CE) states that 'prices must be affordable and must be such that all users have access to the services provided.' Similarly, the UK the Postal Service Act 2011 requires that services be provided 'at affordable prices determined in accordance with a public tariff which is uniform throughout the United Kingdom.' These requirements are mute on what constitutes an

¹In general, affordability of postal products is more likely to be an issue for low income groups.

appropriate definition or measure of affordability. Intuitively, one would consider postal prices to be unaffordable where the consumer were to suffer adverse consequences as a result of the cost of sending post, e.g. to forego spending on other items including necessities, or be deprived of the value of communication as a result of not sending post (Ofcom 2013). In sectors such as energy and health, affordability is defined in terms of household budget shares. For example, the UK government considers fuel unaffordable to households who spend more than 10 % of their income on fuel and heating related costs (DECC 2013). Similarly, the World Health Organization (WHO) assesses the affordability of medical treatment by calculating the number of days the lowest paid unskilled government worker must work in order to pay for a course of treatment with a particular drug (WHO 2008).

While basing a service's price on cost promotes some form of economic efficiency, this may not mean that the service is affordable. As costs rise, lower income groups may become excluded from purchasing the good. The European Commission Green Paper on services of general interest (2003, p. 38) makes this point: 'Affordability should not be confused with, and does not necessarily equate to, cost orientation. Indeed, the best the market could offer is a price oriented towards cost. However, if this cost is not judged to be affordable, the State may choose to step in to ensure that everybody has affordable access.'²

Postcomm (2011, p. 11) proposed the following definition of affordability for residential consumers:

A universal postal service product, for example, a First Class stamp, would be 'unaffordable' if a potential residential customer was entirely excluded from purchasing it or faced significant hardship from purchasing it because of the price.

Postcomm considered two questions in testing whether universal postal service prices are affordable for residential customers: (1) Is household expenditure on universal service postal products within household budgets? and (2) Are universal service postal products priced below households' willingness to pay for them? A positive answer to both questions would indicate that prices are affordable; however, Postcomm noted that it is possible for the test not to be passed and for prices to still be affordable. It should be noted also that some negative own-price elasticity of demand indicates that somewhere a price rise is causing someone/some household 'not to be willing to pay' for the product at the higher price. Postal spend was found to account for less than 0.15 % of average household expenditure and less than 0.25 % of low income household expenditure. Postcomm considered prices to be affordable for residential consumers at the time and found no evidence of affordability issues from consumer surveys, in which 'affordability' was understood to mean 'having enough money to make a purchase without getting into too much difficulty.'

²While affordability is a legal requirement, its interpretation is typically inclined towards residential consumers rather than business consumers. Although there are potentially affordability concerns for all business consumers, the focus might be on small business customers. It could be argued that regulators should not aim to protect one large firm from another and in any case, promoting prices which are aligned towards cost will ensure some level of welfare maximisation in which business consumers receive the best prices.

2.2 *Measuring 'Affordability'*

Ofcom (2013) surveyed EU regulators on their approach to measuring affordability and found a variety of approaches to assessing affordability across Member States, including the use of comparators such as postal expenditure as a proportion of income or total household expenditure, in which case prices are deemed affordable when they account for a sufficiently low proportion of average income; undertaking consumer research to elicit consumers' views on whether prices are considered affordable; price cap/cost orientation in which case the regulator considers prices orientated toward cost as being de facto affordable since prices below cost would imply a financially unsustainable service; and international benchmarking, in which case prices are considered affordable where they are below or not significantly above prices for similar products in comparable countries. We take issue with some of these approaches: firstly, where expenditure on a good represents a low proportion of average income, it may be unaffordable for some individuals (with below average income) whose spending on that good is zero; and secondly, a survey approach may be too broad in that it may capture the views of all income groups, such that the affordability issues of low income groups are not well represented.

Ofcom (2013) assessed the affordability of prices in the UK ahead of Royal Mail's proposed prices increases in April 2013. Their approach employs data on consumer spending patterns by consumer type and over time, comparative data on expenditure on other items such as utilities and food, and a range of consumer surveys and stakeholder consultations. Budget shares of spend on postal products are computed for five income groups: all households, those in the lowest fifth quintile of income, households with someone aged 65 and over, low income households (lowest fifth quintile) with someone aged 65 or over, and households with no internet connection. Based on data from the Office for National Statistics, average household weekly expenditure on post in 2010 was close to 53p per week (2012 prices), forming a budget share of 0.11 %, as compared with about £13 for all communications services. It was found that average weekly postal expenditure has generally fallen in absolute terms and as a share of budget (0.15–0.11 %) for the five consumer groups over the last 10 years. From the figure below, yearly spend is estimated at about £72 per consumer. The findings suggest that postal prices are affordable for all income groups, including more vulnerable groups (Fig. 1).

Borsenberger et al. (2012) argue that the low budget share of postal spending does not rule out affordability issues, as a large part of postal services are used as an input into the production of many other goods consumed by households. In this way prices of postal services have an indirect impact on household budgets through the price of final products that use postal services as an intermediary input. Where the markets in which businesses operate are competitive, they have an incentive to pass on the bulk of the increase in costs attributable to rising postal prices. Borsenberger et al. (2012) note that in 2008, 89 % of global demand for postal services (final and intermediate) in the UK came from UK companies who use postal services as an input to production. Thus, affordability issues for final consumers could arise as a result of increases in firms' operating costs and may fall outside the scope of traditional regulation, although, rates for businesses, especially SMEs, may be regulated too.

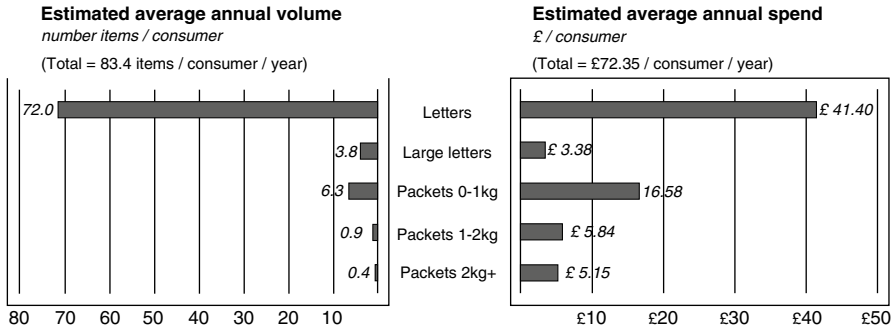


Fig. 1 Estimates of average volume and expenditure on postal products in the UK. (Source: Ofcom 2013)

Borsenberger et al. (2012) also found that previous studies had considered affordability in terms of the equivalent units of work-time required to make up a price rise. Deutsche Post (2014) calculates the number of minutes of work needed to pay the postage on a standard letter. This calculation is based on the hourly wage of an industrial worker as estimated by the Cologne Institute for Economic Research (October 2013). The figure below shows that on average it takes 3 min and 40 s to earn the postage cost of a standard letter in Europe. Bulgaria appears to be considerably above average, where it takes almost 11 min, and Ireland appears to be well below average where it takes less than 2 min to earn the postage cost of a standard letter (Fig. 2).

This method seems to be more akin to a consumer price indexation technique, for comparing prices across jurisdictions than a measure of affordability, and is not a universal method that could be applied across many sectors. In spite of this lack of ‘direct’ measurement of affordability, there is nonetheless a clear indication of a very wide range of the ‘real’ price difference across jurisdictions. If all consumers had similar tastes, needs for mail, and ability to use substitute and complementary products, then such a price index would indeed give a ‘comparative’ measure of affordability across jurisdictions; we would be able to say, for example, that Bulgaria’s prices were less affordable than Germany’s. We also reemphasize that the issue of lower income groups is not necessarily addressed by indices of work-time per postal price (although in theory this could be done).

2.3 Proposed Minimum Affordability Test Requirements

The definition of affordability according to Postcomm (2011) may be too restrictive in that the outcomes of unaffordable prices are either ‘no purchase’ or ‘significant hardship.’ Low budget shares but positive outcomes in terms of actual purchases made could nonetheless indicate some level of affordability. Low budget share could therefore be seen as an indication of affordability but not a necessary condition to conclude that prices are actually affordable. And while the impact of any

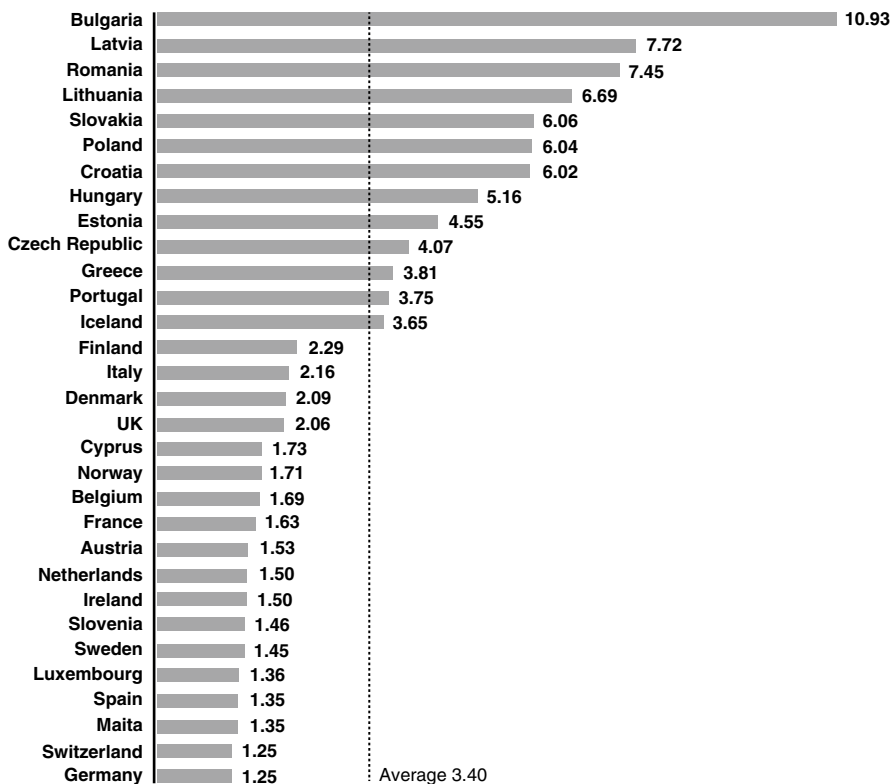


Fig. 2 Work minutes taken to earn the postage cost of a standard letter by country (Source: Deutsche Post 2014)

price rise on the overall household budget is likely to be small, it could be the case that the consumer could already be unable to afford other necessities such as food, heating and clothing, etc.

To examine the own-price elasticity of a product may give little indication of affordability as the consumer could stop purchasing the product because they cannot afford it or they could purchase it and forego other necessity goods. A price increase will engender affordability issues only to the extent that substitution is not possible. We propose that an appropriate measure of affordability should recognise that affordability could provoke either a reduction in demand of the own product due to the income elasticity of demand or a reduction in other necessity goods such as food or heating.³

³While we do not provide a detailed mathematical description, we would note that the original AIDS model framework is based on the notion of the expenditure function, the indirect utility function, and an assumption of invertibility between the expenditure and indirect utility function. As such, the original formulation of the AIDS model thus assumes optimality of the indirect utility function due to the consumer utility maximising behavioral assumption. Therefore, by the envelop theorem, the change in utility with respect to any change in price, gets multiplied by the change in

To examine affordability in the postal sector, we lay out three requisites for the analysis. We firstly have to define a disposable income/demographic class to focus specifically on as it makes no sense to consider affordability for the whole population or higher income deciles. Income must be defined net of tax and transfers and income and the low income group should have savings and net worth close to or near zero. In this way, price increases cannot be financed out of savings, and even where a low income individual does have savings to finance price increases, prices could still be unaffordable as their increase could lead to a depletion of savings.

Secondly, the availability of substitutes and products for substitutability must be low; if the consumer can merely substitute away from a good, then affordability must not be an issue. The USO somewhat rules out the availability of substitutes through price caps and geographically uniform pricing as similar postal products from commercial providers will likely either not be available or will be priced considerably above the USPs. Similarly, complements must not be high in that the greater the volume of other goods used in tandem with postal products, the greater will be the reliance on postal products and hence the cross-price elasticity will be high and negative. Complementary goods must also not be necessities or hold a large share of the household budget.

Third, a time period must be selected for the analysis. As Christmastime sees significantly higher volumes of mail than any other time of the year, it would be enticing to examine this period but it would not be representative of the annual average.

Our a priori thinking is that a price rise would be affordable if there is a high cross-price elasticity, indicating strong availability of substitutes. Low budget share and significant cross-price elasticity between substitutes and other goods would indicate that prices are affordable, while a high own-price elasticity and a low cross-price elasticity with substitutes would indicate that prices are unaffordable. Similarly, a low own-price elasticity, a low cross-price elasticity with substitutes, and a high price elasticity with other necessities would indicate that prices are unaffordable.

3 Empirical Methodology and Data

The estimation and measurement of affordability should ideally account for income class, and substitutes and complements. Such empirical needs and analysis point towards the desirability of estimating a demand system which includes postal products and potential substitute products.

utility with respect to the own quantity, which is zero by the first order conditions. The price change thus only impacts through the expenditure impacts, which result in the expenditure share equations, which are the foundations of the AIDS and PC AIDS models. An interesting and potential further line of research might be to relax the maximizing assumption, and assume that not-affordable somehow was then a deviation from an optimal utility-expenditure point in the price-income-utility space of a consumer, but for now, this is beyond the scope of our work.

A conventional method to examine price elasticities and cross-price elasticities is to use a linear approximate almost ideal demand system (LA-AIDS) model. The AIDS model, developed by Deaton and Muellbauer (1980) is a system of equations approach to demand estimation. This approach is useful in the context of estimating a consistent set of own- and cross-price elasticities as it ensures that the full set of parameters will be consistent with certain restrictions implied by the neoclassical model of consumer demand, such as linear homogeneity in prices and income. Problems with econometric estimation of the AIDS or LA-AIDS models can become prohibitive, especially when there is a large number of products and product categories (which might suggest that insignificance or similar estimation problems are due to lack of data). If one were to try to implement or estimate an econometric model of demand that estimated the total number of parameters, data limitations and a lack of degrees of freedom would likely render the estimates insignificant.

An alternative option for estimation when cross-price elasticities and product demand elasticities are required is to use the proportionality calibrated almost ideal demand system (PCAIDS) model developed by Epstein and Rubinfeld (2001). The PCAIDS method was introduced as tool for postal pricing by Swinand and Hennessy (2014). The PCAIDS model uses an aggregate demand elasticity estimate, and then estimates a variety of other parameters needed to characterize the complete demand system of products using restrictions on the system implied by demand theory, and as the name indicates, a proportionality calibration method.

The PCAIDS model is a two-parameter model and thus the number of parameters to be estimated is greatly reduced vis-à-vis a full AIDS model or similar methods. The PCAIDS model requires estimates (as inputs) of the following parameters: own-price industry elasticity, own-price elasticity of one product in the market, nesting matrix (optional), markets shares for all products (or products and brands) in the industry. Epstein and Rubinfeld (2001, p. 11) describe the usefulness of their model:

It requires information only on market shares, the industry price elasticity, and the price elasticity for one brand in the market. The logic of PCAIDS is simple. The share lost as a result of a price increase is allocated to the other firms in the relevant market in proportion to their respective shares.

By relying solely on data on market share and price elasticity estimates (available pre-merger in the antitrust application, or before a price change—in the case of postal regulatory applications), simulation models (and the PCAIDS model, specifically) are very useful for competition and regulatory authorities wishing to evaluate the possible effects of a proposed merger or a price change (Ivaldi and Verboven 2005). Other models may require the use of *ex post* change regulatory data to evaluate the market effects of a merger or policy change, which can be impractical (Neven and Zenger 2008).

The use of the PCAIDS model has taken hold among competition authorities. This is most likely because mergers and similar competition enforcement analysis might involve two companies with a large number of similar products—breakfast cereals for example. More specifically, the UK's Office of Fair Trading (OFT) uses the PCAIDS model, where appropriate, to evaluate mergers *ex ante* in differentiated

product industries, and a conservative estimate is used for any assumptions made in terms of consumer benefit (see Davies 2010). The OFT uses a set of assumptions and estimates when choosing which simulation model to use. As Jones and Stallibrass (2007, p. 6) stated:

Given the data we usually have available, the economic models we have used are, in our opinion, the best academically supported method for mechanically deriving estimates of the impact of a merger decision for the purpose of impact estimation after a potential Substantial Lessening of Competition (SLC) has been made by the Office.

However, outside of the application of the PCAIDS model to the most recent pricing application from An Post, the Irish USP to their regulator ComReg, we are not aware of similar regulatory applications (see for example, ComReg 2013).

3.1 Assumptions Underpinning the PCAIDS Model

The PCAIDS model is an extension of the standard AIDS model. The assumptions of the AIDS model are also applied in the PCAIDS framework, with three additional assumptions. These additional constraints are adding-up, homogeneity, and proportionality. The adding-up constraint ensures that the right-hand sides' parameter estimates of the system of demand equations sum to the total market (or unity, in the case of market shares). Homogeneity ensures that demands do not change if all factors change proportionally (linear homogeneity of the demand system in prices is a constraint usually imposed in any demand system). The most important restriction for the PCAIDS model in terms of its potential impact on various elasticity estimates is the assumption of proportionality. Under proportionality, the PCAIDS model imposes the assumption that sales are diverted away from a product according to the relative market share of the suite of products in the defined market. So when a hypothetical *ceteris paribus* price rise occurs for one product in the system, a certain amount of total demand in the system is lost as overall demand shrinks, but another portion of that product's demand is shifted to other products in the system.

As the PCAIDS model is a variant of the standard AIDS model, it can be expressed as a system of equations as in (1). Given that a PCAIDS model does not include any AIDS expenditure terms, the share equations below refer to the share of the product whose elasticity is known and a share for all other products in the market. The market shares in this model can be the average of the revenue shares at the end of the sample period. In this case, there is no need for detailed monthly data, which might be used to obtain more degrees of freedom for econometric estimation. This is the main advantage of PCAIDS as it has much lower data requirements when compared with other demand models such as the standard AIDS model or a very data intensive model such as the random coefficients logit model.

$$\begin{aligned} S_1 &= a_1 + b_{11} \ln(p_1) + b_{12} \ln(p_2) + \dots + b_{1,N-1} \ln(p_{N-1}) \\ S_{N-1} &= a_{N-1} + b_{N-1,1} \ln(p_1) + b_{N-1,2} \ln(p_2) + \dots + b_{N-1,N-1} \ln(p_{N-1}) \end{aligned} \quad (1)$$

In (1), $\ln(p_1)$ refers to the natural log of the price of Product 1. As part of the PCAIDS model, the price elasticity for this one product in the market must be estimated separately. In this equation, the coefficient on b_{11} must be converted into an elasticity using (2) below. By imposing the adding-up and homogeneity constraints, we are able to derive the various elasticities with reference to the estimated coefficients. These are shown in (2). The coefficient b_{jj} refers to the coefficient on the price variable in the share equation that is estimated in the two-product LA-AIDS model.

$$\begin{aligned}\varepsilon_j &= b_{jj} + s_j(1 + \varepsilon) \\ \varepsilon_{jk} &= \frac{b_{jk}}{s_j} + s_k(1 + \varepsilon)\end{aligned}\quad (2)$$

The value in this approach is that once the own-price elasticity is estimated for any one product within the market, then this estimate can be used to estimate all other own-price elasticities in the market once the revenue shares are known for all products. These can be derived by applying the equations shown in (3) where ε_1 is the price elasticity of one product in the market and ε refers to the price elasticity of the overall market.

$$\begin{aligned}\varepsilon_j &= \frac{[(1 - S_j)\varepsilon_1 + (S_j - S_1)\varepsilon]}{(1 - S_1)} \\ \varepsilon_{jk} &= \frac{S_k(\varepsilon - \varepsilon_1)}{1 - S_1}\end{aligned}\quad (3)$$

Our approach in this chapter is to use the PCAIDS model and budget shares for the lowest income decile to estimate elasticities for a two product system with Post and Food and Post and other telecommunications products, e.g., internet, mobile phone, landline phone.

PCAIDS is a two-parameter system calibrated on market shares. Parameters are group and product own-price elasticities. We use a two-product system to allow for differences across cross-price elasticities between food-post, post-other communications. We use an econometric estimate of own-price elasticity from HBS data for the group of products (-0.31 and -0.17 , respectively). We use an own-price postal elasticity of -0.22 from previous work.⁴ The application of the PCAIDS model also requires expenditure shares for each of these product groupings, and for these we use the expenditure shares from the lowest disposable income decile from the last two Household Budget Surveys (HBS) in Ireland.

⁴Swinand and Hennessy (2014).

3.2 Data

In order to estimate the impact of changes in postal prices on the demand for food and other communications items and necessities, we obtain data relating to Irish consumers from two sources: the Survey on Income and Living Conditions (SILC) and the Household Budget Survey (HBS). The data runs from 2003 to 2011. We use data on other macro variables including Consumer Price Indices for post, telecommunications products and food from the Central Statistics Office. We find that households allocate only a very small proportion of income to postal expenditure and marked changes have been observed in recent years in line with internet usage and email. These findings are similar to those of Borsenberger et al. (2012), Postcomm (2011) and Ofcom (2013). Summary statistics for expenditure shares by the first income decile are presented in the table below. While we do not present data for other income deciles, studying the expenditure on postal products by income decile indicate that postal products on the whole are inferior goods. This is especially true when we compare the bottom two income deciles with the middle income deciles. The highest two income deciles do indeed spend more on postal products and this may reflect their choice of higher quality postal products (Table 1).

We find also that a very small proportion of households do not have a fixed landline or mobile phone (table below). We take this as a preliminary indication of a lack of substitutability. It would perhaps be up to policy makers to define an acceptable level of complete lack of other means of communications outside of post. Interestingly, of those that do have a landline or mobile phone, some (0.38 %) indicated that they have had to forego at least one meal due to affordability issues. Of those that do not have a landline or mobile phone, 7.6 % reported that they skipped at least one meal in the last 2 weeks. This is as expected as the lowest income groups are likely to have affordability issues relating to many products (Table 2).

4 Results

The data covers the period 2003–2012 (December). Aggregate price indices, such as the monthly CPI and the monthly CPI for postal services were taken directly from the Central Statistics Office, Ireland (www.cso.ie) website. The results of a two product model where post and food⁵ are the only products in the system are shown in the table below. Based on a calibration of cross-price elasticities from the own-price elasticity for post (-0.22), the PCAIDS model shows very small cross-price effects between

⁵There is of course the possibility that the change in postal prices indicates a change in the mix of an aggregate bundle of necessities, such as food; in other words, consumers could substitute from expensive food to cheaper food. Our methodology, in theory, could cope with this as one of the benefits of the PCAIDS method is that it can be broken down into further categories if the budget shares data are available. We do not have a detailed breakdown of cheap food and expensive food from the HBS, however.

Table 1 Summary statistics for expenditure shares by the first income decile

Variable	Obs	Mean	Std. Dev.	Min	Max
share_post	641	0.0017562	0.0077026	0	0.1114133
share_telecom	641	0.0454351	0.0382987	0	0.2721965
share_internet	641	0.0018046	0.0069037	0	0.0824042
share_food	641	0.2248974	0.1247878	0	0.714889
share_other	641	0.7261067	0.1324234	0.285111	0.9806525

Source: CSO Household Budget Survey, Ireland

Table 2 Share of individuals in the first income decile with communications devices who had food affordability issues in the last 2 weeks

Variable	Obs	Mean	Std Dev	Min	Max
d_mob=1(have mobile)	51,156	0.018512	0.134795	0	1
d_mob_fix (have fixed)	26,328	0.003191	0.056396	0	1
d_hunger_1	1,103	0.076	0.4885376	0	1
hunger_and_mobile	84	0.00381	0.32998	0	1

Source: CSO EU-SILC, Ireland

Table 3 PCAIDS elasticity estimates for two-product system: post and food

% Δ Price of		
% Δ Quantity of	Post	Food
Post	-0.220 ^a	-0.039
Food	-0.039	-0.259

Source: London Economics

^aThere is statistical significance of the original or own price elasticity which is derived from separate econometric estimates (See ComReg 2013). It should be noted that the statistical significance of the other resulting elasticities from the PCAIDS method is generally not given as the method is a calibrated calculation and not completely statistical per se

post and food at the lowest income decile. A 10 % increase in the price of postal products would only reduce food consumption by 0.39 %, all else equal. The own-price effect from a change in the price of food on the demand for food is considerably higher than the cross-price effect of a change in the price of postal products on the demand for food, and this is to be expected (Table 3).

A PCAIDS model where post and communications are the only two products in the system is presented below. As before, we based on the model on the own-price elasticity of post which is derived using an LA-AIDS model. Applying the appropriate market shares to the model indicates that communications products are weak substitutes for post. Thus, if the price of post goes up, then the demand for communication products also goes up, *ceteris paribus*. This is expected as individuals may switch to some other form of communication which is less costly (Table 4).

Table 4 PCAIDS elasticity estimates for two-product system: post and communications

% Δ Price of		
% Δ Quantity of	Post	Communications
Post	-0.220	0.050
Communications	0.050	-0.172

Source: London Economics

Overall, the results indicate that a 10 % price rise would only reduce food consumption by about 0.39 %, all else equal. It is somewhat tenuous to assess the significance and the results do not indicate a large substitution impact from post to other communications products. The impact of considering expenditure shares by income decile indicates a very small expenditure share on post and this suggests that post is unlikely to have a large interaction with food or other communications expenditures. This is also likely to be the case with other necessities such as heating and clothing.

The results imply that post is a very weak substitute with telecoms and internet, and is unlikely to have a large impact on purchases of other products such as food. However, it is important to consider that these impacts are likely to differ significantly by income group. With price increases for postal products expected in the future, it is important that these elasticity estimates are monitored. These elasticities should also be monitored at income decile level. It could be the case, irrespective of affordability issues, that at higher income levels, the cross-price effects are significantly higher.

5 Summary and Conclusions

In this chapter, we have examined the issue of affordability in the postal sector. While there is no consensus on what constitutes a price that is ‘affordable,’ previous studies have examined the issue by reference to household budget shares. While this is a start, we propose that a small budget share is not necessarily a guarantee of affordability.

We propose that affordability measurement should include a few principal elements. First, it should define and consider a lower income cohort (e.g., the lowest 10 %), and should consider the income and expenditure shares for that group. This can be based on survey evidence of what levels of necessities certain groups are foregoing or by using more formal definitions of ‘at risk’ for poverty. Second, affordability measurement and investigation should consider the substitutability of other products for postal products, along with interactions with necessity goods such as food. Further, it may be appropriate to examine the cross-price effect with a basket of necessities, including expenditures on heating, clothing and energy in addition to food.

In line with previous studies, we find that households allocate only a very small proportion of their budget to postal products. Based on the PCAIDS models including post, food, and other communications, and data from the HBS in Ireland,

cross-price elasticities with other communications products is found to be very small, suggesting that mobile phones and internet usage have had low substitutability with postal products. We also find that the cross elasticities with necessities such as food are low; a significant (10 %) increase in postal prices would only reduce food demand by about 1 %, all else equal.

Thus our conclusions are somewhat weak in terms of affordability, as the indications from our PCAIDS-based model using Irish HBS data are that the postal products have low budget share, low substitutability, and low impacts on necessity products. Further, the PCAIDS model is somewhat limited in terms of its strong assumptions which allow insights to be made from sparse data.

Additional research is thus warranted that might include better data and more detailed econometric modelling of the interaction effects between postal products and substitute and necessity goods. It would be interesting to apply our framework to other countries and examine the cross price effects between postal products and necessities as well as other communications products. It could be the case that for some countries the effect is more substantial. For example, as discussed above, Deutsche Post (2014) found that in Bulgaria, it took 10.93 work minutes to earn the postage cost of a standard letter, whereas in Ireland, it took only 1.5 min.

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