

How could Royal Mail undertake 'class costing'?

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Executive summary

'Class costing' is the term given by Royal Mail to a set of principles that attempts to recognise that some costs are incurred to provide the first-class service and this should be reflected in the cost-allocation methodology. The use, and development of, class costing were among the issues discussed with Postcomm as part of the consideration of Royal Mail's 'Pricing in Proportion' proposal, during which the regulator carried out a detailed review of Royal Mail's costing system. Oxera has been asked by Royal Mail to provide an independent, economic assessment of the development of its 'class costing' initiatives. This report presents the results of this investigation into whether the development is appropriate, and suggests ways in which Royal Mail could develop it further in providing a more accurate costing methodology.

The existing cost allocation methodology incorporates class costing principles to a limited extent when allocating costs according to the fully allocated cost (FAC) principle, using Royal Mail's activity-based costing (ABC) model. The essence of Royal Mail's concern is that, because of the limited recognition currently given to the principles of class costing, the resulting costs associated with each product or set of products cannot be thought of as truly cost-reflective.

The need for prices to be more cost-reflective is generally acknowledged as being crucial as liberalisation proceeds. Without Royal Mail setting cost-reflective prices, there is a risk that efficient entry (ie, entry by competitors with a cost level similar to, or less than, that of Royal Mail) may be deterred in some parts of the sector, while at the same time inefficient entry may take place elsewhere.

Class costing has been developed with this general problem in mind, related in particular to the allocation of costs between Royal Mail's first-, second-, and third-class products and services. The following exercise needs to be undertaken, addressing the counterfactual:

- if Royal Mail did not have to provide a first-class service, what cost savings would Royal Mail be able to generate?

These savings are then allocated to the first-class service. Further iterations are taken with regard to the second- (and third-) class service. The intention behind this is that it more accurately and closely captures the costs incurred by Royal Mail as a result of having to provide the first-class service with its higher specification than the second-class service.

This report finds that, at a high level, the principles underpinning class costing have many of the characteristics of certain types of (long-run) incremental cost (LRIC) methodologies. In particular, both Royal Mail's class costing proposals and many incremental cost methodologies address this kind of counterfactual: if this particular service or product did not have to be provided, what costs would be saved? The advantage of determining costs on this basis has been frequently acknowledged by academics, as well as the Competition Commission and many UK economic regulators. There are also precedents for costing methodologies following these principles in the postal sector: the costing approach used by the United States Postal Service (USPS) and the precedent established by the European Commission in the Deutsche Post case. The advantages of costing methodologies based on these principles are that they are more cost-reflective and, as such, they more closely represent the costs that would prevail in a competitive market than those emerging using an FAC approach. It has also been acknowledged that prices based on LRIC assessments are more likely to encourage efficient entry.

Oxera understands that Royal Mail is planning to develop further its class costing proposals beyond the limited application currently within the ABC model. These proposals involve what might be called 'ad hoc' adjustments, in that they are not linked to Royal Mail's existing models (although they do take account of outputs from the models). As Royal Mail undertakes these changes, Oxera has identified ways in which these changes could be made so as to preserve/enhance the LRIC-type properties of Royal Mail's class costing proposals. These are outlined below. If these principles are reflected in the development of these ad hoc adjustments, which can be implemented relatively quickly, then it is considered that the adjustments are likely to provide directionally more accurate estimates of the costs that should be attributed across the service groups. In reaching this conclusion, attention has been given to the relatively ad hoc ways in which (long-run) incremental costs have been estimated in other contexts, most particularly in the European Commission findings on Deutsche Post.

The principles or issues that Royal Mail needs to consider in developing further its class costing proposals include the following.

- A decision needs to be made as to when to undertake the exercise examining what costs savings Royal Mail would make in the absence of the first class service, and how the current service level volumes should be treated when the service is removed (ie, do all the volumes switch to an alternative service class, do none of them switch, or only a certain proportion?) If the purpose of the exercise is to capture as closely as possible the proportion of existing costs that are incurred in providing the first-class service, it would be more appropriate to calculate the incremental costs of the first-class (or other) service assuming that none of the volume switches. This would be consistent with the approach taken to calculating (long-run) incremental costs elsewhere in the postal sector (ie, by the USPS and in the European Commission Deutsche Post case).
- In developing its proposals, Royal Mail needs to decide whether radical network redesign would be required once the first-class (or other) service is no longer provided. In making this decision, attention needs to be given as to why the exercise is being undertaken. It is Oxera's understanding that the purpose is to provide a more accurate allocation of the existing costs across the different types of service. Given this objective, the exercise should, arguably, focus less on hypothetical network redesign without one of the services than on how the costs of operating the existing network could be altered.
- In an early version of its class costing proposals, the approach proposed by Royal Mail for the second-/third-class service was not the same as that used for the first-class service. A more economically appropriate costing outcome is likely to result if Royal Mail follows the same approach to the second- and third-class service (ie, it estimates the costs that would be saved if this service were no longer provided).

Finally, attention needs to be given to the modelling approach to be taken by Royal Mail in developing its class costing approach further. As mentioned, class costing is already incorporated into the ABC system to a limited extent, and Oxera considers that the adjustments made to facilitate this are appropriate. As Royal Mail develops its ad hoc adjustments to this approach, this report discusses ways to enhance the modelling approach, such as taking into account capital costs. However, in the longer term, there may be benefits for Royal Mail if it were to develop a stand-alone model that addresses more accurately the counterfactual question inherent in incremental cost approaches. As and when this model is developed, it should be borne in mind that its purpose will be to allocate existing costs across the different service types. Given this purpose, it is likely that fundamental network redesign within this model would be inappropriate (as it is unlikely to be particularly informative about how the costs incurred in the existing network should be attributed across the different service groups.)

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1 Introduction

Oxera has been asked by Royal Mail to provide an independent, economic assessment of Royal Mail's current approach to 'class costing' and proposals for its development. This report presents the results of this investigation and suggests ways in which, as Royal Mail develops further its approach to class costing, it can create a set of proposals that may be relied upon to provide a more accurate costing methodology and hence be used in determining cost-reflective prices.

An early version of Royal Mail's class costing proposals described class costing as a two-step process:¹

1. To assess the costs of an operation where all the first-class volume is, instead, second class and to ascribe the difference to first-class; followed by
2. To assess the costs of an operation where all the volume is third class and to ascribe the cost difference between (1) and (2) to first and second class on the basis of relative volume.

The key feature of the methodology is that it involves undertaking an exercise to consider what costs would be saved if a particular service no longer needed to be provided. As a result of such an approach, the allocation of costs between different service groups is likely to differ significantly from the current allocation determined by Royal Mail's activity-based costing (ABC) model. The purpose of this report is to assess which of these approaches might be more appropriate, and, if the class costing proposals are considered to have some validity, to discuss how these may be further developed.

The structure of the report is as follows:

- section 2 places the ensuing discussion into context by setting out a range of important costing concepts. In particular, it looks at the concept of (long-run) incremental costs and how this costing methodology has become increasingly popular in recent years;
- section 3 discusses a range of regulatory and competition law precedent, focusing on the development of (long-run) incremental cost methodologies;
- in light of the theoretical and precedent discussion, section 4 provides a theoretical assessment of Royal Mail's class costing concept. It argues that it has many characteristics that are akin to an incremental cost approach, and discusses the ways in which, as the proposals are refined, these characteristics may be preserved and/or enhanced;
- section 5 considers the current implementation of Royal Mail's class costing proposals, (which make use of its ABC system), looking at whether this is appropriate, and discussing how the modelling approach may be refined, in both the shorter and longer term.

¹ Material provided to Oxera by Royal Mail.

2 Relevant theoretical concepts

This section discusses the key theoretical concepts relating to cost allocation.

2.1 Regulatory interpretations of cost-reflective pricing

It is generally recognised that, for economic efficiency to be obtained, prices should reflect the costs of providing the given good or service. Regulators and competition authorities worldwide have endorsed this requirement, while the EC Directive on postal services (2002/39/EC) requires that prices be 'geared to' costs. However, the question of which costs precisely should be reflected in prices has been subject to considerably more debate and is far less clear-cut.

This discussion has taken place despite the fact that economic theory points clearly in the direction of one particular rule: prices should be set equal to the marginal cost of producing the next unit of the good/service. If this approach is followed then consumers will face prices that 'signal' the economic costs associated with the production of that good or service, and will make their consumption decisions depending on whether the marginal benefit of consumption is greater than the marginal cost. However, for several reasons, marginal cost pricing has a number of features that make it undesirable to implement.

- In the presence of fixed costs, marginal cost pricing does not allow for full cost recovery. This is likely to be of particular concern in a network context where many of the costs incurred for network construction are sunk and where the marginal cost of an extra unit of output is likely to be close to zero.
- Additionally, marginal cost pricing can lead to a highly volatile profile of prices. As outlined above, in certain (network) industries, the marginal cost of an additional unit of output is likely to be low for most of the time, as most costs associated with network provision are sunk. However, when capacity becomes constrained, the provision of just one additional unit of output will require considerable new capital expenditure, meaning that the marginal cost for this unit will be high. This 'saw-tooth' profile of prices is generally considered undesirable for consumers.

As a consequence, alternative mechanisms have been considered. These are explained below, taking note of how they are implemented in a multi-product firm such as Royal Mail.

2.2 Average costs: fully allocated costs/fully distributed costs

2.2.1 Single-firm product

Given the concerns about marginal cost pricing discussed above, an intuitively appealing approach is to identify all (efficient) costs associated with the production of that good/service and to set prices such that, for a given volume projection, total revenues are equal to total costs, where total costs include an appropriate return on the capital invested in the business. In turn, this implies that the average revenue (ie, price) is set equal to the average cost of producing all units of the good/service up until that point—ie, there is average cost pricing. The appeal of using this rule is that, if implemented properly, it should ensure full cost recovery of all (efficiently) incurred costs, while at the same time, by including a 'reasonable' return on capital, but no more, it should prevent companies from earning what might be considered excessive profits.

When using this pricing rule, a decision needs to be made regarding the treatment of capital costs. Unlike operating costs, conventionally capital costs are not expensed in the year they are incurred; instead, they are capitalised with the annual costs reflected in the depreciation charge, and the allowed return on capital determined by reference to the weighted average cost of capital and the non-depreciated part of any asset base. Assuming that any such costs are capitalised, a decision also needs to be made as to how these capital costs are assessed. There are two methodologies:²

- **historical cost accounting (HCA) basis**—this states that the capital cost is given by the cost at which the company initially acquired the asset (potentially adjusted for inflation), on a gross basis, or less any depreciation of that asset on a net basis. By assessing capital costs on this HCA basis, the price-setting mechanism ensures that the initial financial outlay on capital costs made by a company (or, more specifically, by investors in that company) is recovered over a period of time;
- **replacement cost, or modern equivalent asset (MEA) value**—this requires the capital cost to be recorded as the cost of replacing that asset with one of equivalent productive capability, to satisfy the remaining service potential of the asset being valued, allowing for any difference in both quality of output and operating costs. As with HCA values, replacement costs/MEA values can either be recorded as a gross value (ie, what it would cost to replace an old asset with a technically up-to-date new asset with the same service capability), or on a net basis (ie, the depreciated value, taking into account the remaining service potential of an old asset compared with a new one). The replacement cost of an asset is likely to differ from the HCA value of an asset due to technological progress or asset-specific price inflation/deflation.

Even in the case of a firm producing only one good or service, it can be seen that defining total, and hence average, costs is not a straightforward exercise. Nonetheless, once these problems are resolved and the appropriate total costs have been identified, it can be said that the costs are fully allocated, or fully distributed, to the production of the good or service. However, when there is a multi-product firm, the problems become more significant.

2.2.2 Multi-product firm

In a multi-product firm, some additional concepts need to be defined.

- **Direct costs**—all the costs, including capital cost and other expenses, which can be directly and *exclusively* attributed to one particular line of business/product. These might include costs that an accountant would term as ‘indirect’ because they do not vary with volume.
- **Common costs**—these typically arise when two or more products are produced together, even though they could be produced separately, and when, as a result of this, the costs are not solely attributable to a single product. A typical example of common costs are the corporate functions of a company.
- **Joint costs**—these are incurred when the production facilities are responsible for the production of two or more products that cannot be separated. In essence, it may be possible to allocate some common costs, using indirect approaches, to a particular product, but this will be impossible if there are joint costs across the two products.

² It may that assets could be valued for price-setting purposes according to principles other than their ‘cost’. This will be addressed more fully in the asset-valuation exercise.

- **Stand-alone costs**—these are costs that would be incurred by a multi-product firm if it were to start producing only one of its outputs. In the presence of common and/or joint costs, the stand-alone costs of a particular product or service will be greater than the direct costs of production.

The definition of fully allocated costs (FAC) remains the same as in the single-product case—ie, the costs attributed to a particular line of business when all the costs of the business have been allocated across the different products of that business. The FAC of a product or service will therefore include all its direct costs, which would act as a floor for the costs allocated to that product, as well as, possibly, an allocation of the joint or common costs of production. The ceiling for FAC would be the stand-alone costs.

An important question, therefore, is whether and how common and/or joint costs should be allocated between different products such that an assessment of FAC may be derived. An essential point is that there is no inherently ‘correct’ way for allocating these costs, as Oftel noted in its discussion of the pricing of Sky’s conditional access regime:

Although there are distributions of common costs that would not meet the fair, reasonable and non-discriminatory tests there is no unique allocation of costs implied by this requirement.³

Methods of allocating common and joint costs are discussed in the section on ABC below. However, in recent years, particularly for regulatory purposes, concerns have been expressed regarding the appropriateness of the FAC/fully distributed costs (FDC) approach to assessing costs. These concerns have focused on the concern that a FAC/FDC approach to costing products can often result in a substantial proportion of costs being classed as indirect and therefore requiring allocation to different products and services in a somewhat arbitrary fashion. Further specific concerns have been expressed when assets are valued at historical cost within the FAC/FDC framework, as the costs of supply will not reflect the current cost of supplying the products or services.

2.3 Long-run incremental costs

The FDC/FAC approach is increasingly being considered as inappropriate by regulatory authorities, particularly (but not exclusively) in a context in which the introduction of competition is being sought. As a consequence, greater focus has been placed on costing approaches that seek to preserve some of the benefits associated with marginal cost pricing, while adjusting for the practical weaknesses associated with its implementation. In particular, an attempt has been made to consider marginal cost pricing over a larger increment and a longer time horizon—ie, looking at the costs incurred by the provision of more than one extra unit at a time and therefore also considering both operating and capital costs.

The benefits from developing a long-run incremental cost (LRIC)-based approach have been highlighted by Ofcom, which argued the following:

Ideally for economic efficiency, charges should be set in a way which encourages buyers to take account of the resource costs of their purchasing decisions ... In a regulated environment, LRIC+⁴ based charges are the ones that most accurately reflect the resources consumed by the provision of the services and, thus, correspond more closely to the charges that would occur in a fully competitive market. LRIC+ based

³ Oftel (1997), ‘The Regulation of Conditional Access for Digital Television Services’, March.

⁴ The ‘+’ element of the reference is discussed later in this report, and does not materially alter the advantages discussed.

charges also encourage efficient entry at the network level because they reflect replacement costs, which are the costs that would be faced by a new entrant⁵

There are several ways in which such a LRIC estimate can be calculated. Two of the most important questions that need to be considered when devising an estimate are the following.

- Whether to consider the ‘increment’ of extra output as being that output which would be incremental to the current level of output, taking into account future demand projections, or whether to consider the increment as being the entirety of the current level of output plus (possibly) future changes in that output. The first approach more accurately reflects only the future costs of providing a service and thus has more in common with a ‘standard’ marginal cost pricing rule. However, it also suffers from many of the same problems because if the incremental cost for future output is relatively low, it may not lead to full cost recovery of previous investment. The alternative approach avoids these problems but is also likely to average the cost over a much larger quantity of output.
- What type of increment to consider? In a network business, it is possible to define the ‘product’ for which the LRIC estimate is being provided as either a particular good or *service*, or as being related to a particular *element* in the production process. For example, in a telecoms example, the LRIC estimate for a particular type of call could be estimated (the first approach), or for a particular element in the value chain (eg, access or conveyance).

With regard to the first question, particularly in telecoms, the approach frequently taken is that all output is considered to be included within the increment. Consequently, one way in which the LRIC estimate can be explained and/or calculated is that, rather than seeking to ‘build up’ to an estimate of all the costs associated with a given element or service, the LRIC estimate can be thought of as the costs that could be saved (or avoided) by no longer providing that service or element. For instance, when developing a LRIC model for BT, OfTel stated that:

Long run incremental costs ... can also be seen as the costs that the regulated firm would avoid if it decided not to provide the regulated service(s) any longer, taking the long run perspective⁶

This is then considered in relation either to a particular service, leading to an estimate of ‘total service long-run incremental cost’ (TSLRIC), or to a particular element in the value chain, leading to an estimate of ‘total element long-run incremental cost’ (TELRIC). Confraria et al (2001) explained these two estimates as follows:

TSLRIC measures the difference in cost between producing a service and not producing it. TSLRIC is LRIC in which the increment is the total service. TSLRIC seems to have been devised to deal with the fact that the long run incremental cost should include all items necessary to offer the product or service to the consumer, and not just be limited to the technical means of delivery. Thus TSLRIC would include activities as billing, payment, collection, network planning etc ... TELRIC on the other hand ... is connected to the ‘unbundling’ of the incumbent’s business. TELRIC includes the incremental cost resulting from adding or subtracting a specific network element in the

⁵ Ofcom (2004), ‘Review of the Wholesale Local Access Network’, December.

⁶ Ibid. Strictly speaking, in the presence of sunk costs (costs necessary to provide a good or service, but which cannot be recouped if the good or service is stopped), considering an increment or a decrement will not lead to identical answers.

long run ... generally this unbundling is limited to certain aspects of the network infrastructure and that is why it is termed TELRIC.⁷

In either approach, or indeed any other, to acquire a LRIC estimate, the following important issues arise.

- One of the most significant differences between LRIC estimates and more conventional FAC methodology is that the former are explicitly forward-looking—ie, they are the costs that a new entrant would incur today if it were to enter the market and provide that particular good or service. Therefore, LRIC estimates should value assets according to their current depreciated replacement cost rather than the historical cost at which they were acquired.
- When calculating a LRIC estimate, two broad types of approach can be used: scorched node or scorched earth. The former takes the existing network configuration as given; by contrast, the latter assumes that a new entrant would be able to optimally reconfigure the network, leading to a lower cost estimate. There has been considerable debate over which assumption is more appropriate.
- As discussed above, a TSLRIC approach can be regarded as estimating those costs that would be saved if the company stopped providing a particular good or service. In a multi-product/service company, this is significant as it means that common or joint costs between different services or products are not allocated to different products. In other words, as with a FAC/FDC approach, there remains a need to devise a means of allocating costs that are joint or common across a number of products or services, although typically the proportion of these costs is smaller.

2.4 Allocation of common and joint costs

As examined above, by definition, a FAC/FDC methodology requires some form of allocation of those costs that are not directly caused by one product or service. Furthermore, in many versions of assessing LRIC (even TSLRIC or TELRIC), if full cost recovery across the goods or services is to be ensured, some form of allocation of common or joint costs across these different products will be required.

There is a misconception that ABC represents the ‘gold standard’ of cost allocation and that it should be applied whenever technically feasible. ABC seeks to identify the causality of cost, but it needs to be emphasised that cost causality cannot be applied to all common costs, nor, by definition, to any joint costs.

A distinction has already been drawn between common and joint costs, with the former being incurred when activities for the production of multiple products are brought together as a matter of choice, and the latter where joint production is inevitable. This is a useful operational distinction, although an alternative distinction is based on links between output levels and input costs. Costs are joint when the relative proportions of outputs are constant such that the costs of production vary with the combined output, as opposed to the chosen output of the component products. In the case of common costs, however, the relative proportions of output can be varied; thus, costs can be traced to the level of output of individual products, not directly, as in the case of direct costs, but by means of ABC. In practice, the two methods of distinguishing joint and common costs provide very similar results.

⁷ Confraria, J., Noronha, J., Vala, R. and Amanate A. (2001), ‘On the use of LRIC models in price regulation’, available at <http://userpage.fu-berlin.de/~jmueller/its/conf/dub01/papers/confraria.pdf>.

The difference between common and joint costs can be illustrated by a transport example (see Box 2.1 below).

Box 2.1 Example of the difference between joint and common costs: transport

A train carries commuters into the city early in the morning and returns nearly empty for a second trip. The seats in the first- and second-class carriages share common costs: the carriages have been linked together for convenience. However, the seats on the upward and downward journeys share joint costs: the delivery of upward and downward services is inseparable—the train has to travel in both directions.

The allocation of common costs between products requires that the underlying activities and their cost be identified. Studies analyse the cost drivers and their consumption by the products, and costs are allocated accordingly. In this transport example, the costs of traction power and the time of stewards could be allocated between the first- and second-class passengers.

The allocation of joint costs is more problematic. A work study would indicate that the costs of the upward and downward journeys are similar (the only difference between a full and empty train being the trivial cost of issuing tickets). Yet the train only runs for the benefit of commuters; thus, the principle of causality would suggest that this group should bear almost the full cost and the return journey should be treated as a by-product and bear the negligible incremental cost. However, should this principle hold in the evening when the commuters return and leisure users make trips in the opposite direction? The latter would use the train and should therefore share the costs of its operation, lowering the costs for the homebound commuters.

In allocating indirect costs, the Baumol–Willig conditions state that the allocated costs should be no greater than the stand-alone cost and no less than the direct cost. However, there is often a large gap between these two, and a degree of judgement is required to settle on the final allocation of costs, in which the relative demand for products is acknowledged.⁸

In the absence of an ABC system, three allocation bases have been used:

- **input-based allocation**—indirect costs can be apportioned to a particular line of business based on other known inputs employed in the production of that line of business. Such inputs could include labour employed (number of employees, time spent or wage bills), raw material costs, or floor space used. A combination of input indicators can also be used (eg, the total direct or incremental costs of the line of business);
- **output-based allocation**—indirect costs can also be allocated using output indicators, such as production or sales volumes;
- **value-based allocation**—here indirect costs are allocated based on demand factors, such as the prices, revenues or consumers' willingness to pay. One variant is to allocate costs using the Ramsey pricing principle. This states that it is economically efficient to recover a relatively larger part of common or joint costs from those customers whose demand is relatively more inelastic. (The efficiency of Ramsey pricing lies in the fact that it tends to lead to higher total output, and hence generates higher surpluses for consumers.)

For price-setting purposes, some value-based cost drivers should be used with caution, as a circularity problem may arise. For example, if revenue is used as a cost driver, excessively high profits tend to be overlooked since higher prices lead to higher levels of cost allocated to that line of business, and, consequently, lower estimates of profitability. Likewise, excessively low profits tend to be overlooked as the lower prices mean that lower costs are allocated to the particular line of business, and hence profits appear to be higher.

⁸ For more discussion on these points, see Oxera (2003), 'Assessing profitability in competition analysis: A report prepared for the Office of Fair Trading by Oxera', July.

With regard to input- and output-based drivers, these can be applied to the indirect costs through the following approaches.

- **A direct approach**—this refers to the relatively straightforward application of the chosen driver (or drivers) to the indirect costs. For example, if directly employed labour (headcount) is the chosen driver, indirect costs would be allocated proportionally across the lines of business based on that driver.
- **Equi-proportional mark-up (EPMU)**—an EPMU is applied across all products based on the direct costs of each product. In other words, if £50 of indirect costs had to be allocated across two products, each with £40 and £60 of direct costs respectively, a mark-up of 50% would be applied to each product, so that £20 would be allocated to the first product and £30 to the other.
- **ABC**—this is a more refined version of the above two methods. Under ABC, the indirect costs are first segregated by activity and then assigned to particular lines of business based on the cost drivers of the activities. For each activity, the cost assigned to each line of business is then allocated using the most suitable indicator.

The limitations of these first two approaches have been recognised by accountants, with the third approach, ABC, developed in response.

2.5 Activity-based costing

ABC was developed as a management tool, as opposed to a means of cost allocation for regulatory purposes. Before considering the details of the technique, it is worthwhile recalling its initial objectives.⁹ In summary, important management decisions that require firm information involve the following.

- **Reducing the ‘cost of complexity’**—often a large proportion of the profit of a business derives from only a few projects and customers. A clear understanding of how indirect and overhead costs are driven allows the product line and customer range to be pruned to increase profit.
- **Driving out embedded costs**—many overhead costs are incurred through needlessly high transaction volumes in clerical activities, which can be reduced once the causes are understood.
- **Rationalising sites**—by using activity analysis to reduce operational complexity and product proliferation, operations can be condensed onto fewer sites.
- **Appraising major investments**—it is unsatisfactory that major strategic advantages, such as flexibility and improved quality, are vaguely labelled ‘intangible benefits’ during justifications for new investments. Activity analysis not only examines these benefits, it quantifies them.
- **Improving customer service standards**—management cannot improve customer service standards unless they have a cross-departmental view of the activities that fulfil a customer's requirement.

⁹ Booth, R. (1997), *Practical Cost Management*, The Chartered Institute of Management Accountants, London.

- **Analysing the cost of quality**—total quality management users often cite the cost of quality to be 30% of turnover. Activity analysis is used to identify where and why these costs are incurred so that management can take action.
- **Installing new performance measures**—once activity analysis identifies the key areas for cost control and service provision, new performance measures can be installed to ensure the company operates properly.
- **Setting price strategies**—once product and customer profitability is clearly established, prices can be changed to boost profitability. Sensible minimum-order quantities and surcharges for product customising can be included in pricing structures.

The common theme of these objectives is the control of fixed costs and only one of the listed objectives involves the setting of prices. It may seem surprising therefore that ABC has now acquired such prominence in allocating costs in order to set prices—indeed, its use in this area has arguably become over-extended and is sometimes applied to costs without considering whether a cost is common or joint, or whether it is meaningful to analyse the link between the causality of cost and a particular product.

2.5.1 Overview of method

ABC is a method of linking costs to activities rather than to outputs in the first instance. The costs are then traced to outputs based on the link between activities and output. By focusing on processes, some costs that may initially not be obviously directly related to particular outputs can be traced to the relevant outputs.

The following steps are involved in applying ABC.

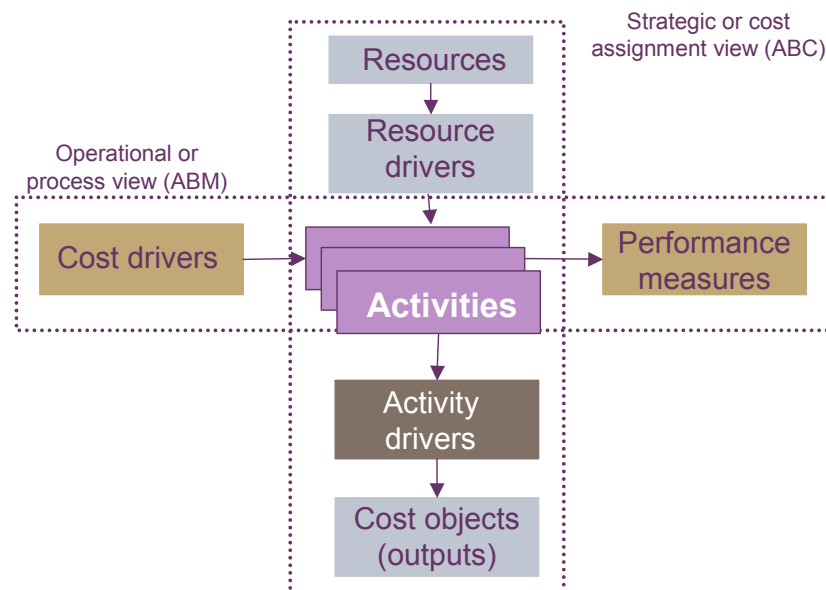
- **Define an analysis framework**—the products, customers and business processes to be costed also need to be established at this stage and the scope of interviews of the activity centre managers, which will take place in later phases, needs to be agreed.
- **Determine cost base**—major decisions are usually controversial and vested interests are often at stake. Hence no ambiguities in data can be allowed and an accepted source of information has to be used for any analysis. The general ledger is an obvious source of information, but an alternative is the budget for the forthcoming period, which may be preferable if the organisation is changing rapidly, but has the disadvantage that it is not usually prepared in such a fine level of detail. The cost lines of the general ledger or budget are then grouped into ‘cost elements’ such as labour costs and depreciation. This reduces the data manipulation to manageable levels while different behaviours are treated separately when tracing costs to activities and products.
- **Build an activity dictionary**—it is necessary to develop an inventory of activities in conjunction with the department managers. At this stage, it is useful to have access to an activity library compiled from experience of similar projects. Not only does this ensure that a comprehensive list of activities is drawn up, it also prevents different names from being assigned to the same activities. The only danger of using an existing library is that it encourages a mechanistic approach to the whole exercise.
- **Calculate activity costs**—once a list of activities and the ‘cost elements’ to be used in the analysis have been established, it is necessary to trace costs to activities. Staff costs are generally traced on a survey of time spent, while non-staff costs are traced using factors relevant to that particular cost—eg, depreciation costs may be traced according the capital equipment dedicated to a particular activity.
- **Assign non-financial attributes**—information on the non-financial attributes is gathered and associated with the activities in the dictionary (eg, cost variability).

- **Calculate product and customer costs**—the next stage is to trace the activity costs to the products and customers (or other ‘cost objects’, such as distribution channels). This is where a real understanding of cost behaviour is necessary in order to identify factors to trace activity costs to the products or customers. These are usually the cost drivers (eg, the number of invoices per customer will be used to trace the cost of the invoicing activity).
- **Calculate process costs**—it is also possible to calculate the costs of sets of related activities which cross departmental boundaries (ie, processes). Costs can be traced to processes in a similar way to the tracing of product and customer costs. However, it is usually sufficient simply to group whole activities together into processes, rather than seeking to apportion activity costs between processes.

2.5.2 ABC standards

The accounting bodies have not set ABC standards, but a de facto standard has been developed by the Consortium for Advanced Manufacturing International (CAM-I). CAM-I has produced an ABC glossary and summarised the ABC method in the form of ‘CAM-I cross’, depicted below.

Figure 2.1 CAM-I cross of ABC



Source: Oxera and CAM-I.

Royal Mail’s ABC system follows the CAM-I standard closely, to the point of incorporating the CAM-I cross into its training manuals.

2.5.3 Summary of ABC

Developing from a management tool, primarily concerned with the reduction of fixed costs, ABC has subsequently been applied in cost allocation for regulatory purposes and has the advantage of seeking to establish the causality of costs. However, it can also be misapplied to joint costs; while the comprehensiveness of a detailed ABC system such as Royal Mail’s may provide reassurance, there is no theoretical reason for the use of the resulting data in cost allocation.

This has to be borne in mind by Royal Mail when considering class costing. The source of much of the data to implement the class costing will be the ABC system, and the appropriateness of the data must be considered prior to its use.

2.6 Allocation of capital costs

There is also a requirement to allocate capital costs when undertaking any cost-allocation exercise. This is a three-stage process:

- identify and value the capital items;
- calculate the cost of capital;
- allocate the cost of capital to activities.

The first two steps lie outside the remit of this report. The final step is undertaken with ‘capital drivers’—a concept comparable to ‘cost drivers’ in ABC, in order to allocate capital costs to activities in a similar way as operational costs are allocated to activities. In the postal sector, plausible capital drivers might be:

- area of buildings for the value of property;
- area of land for the value of the land (of a particular type, such as urban, rural);
- number or engine capacity of vehicles for the value of vehicles;
- maintenance hours or cost for the value of machinery (although the approximation involved in this approach will require examination).

Such, or similar, drivers are already collected by Royal Mail through its ABC system.

3 Relevant precedent

One of the most important issues highlighted by the previous section was that the conventional FAC/FDC approach to allocating costs is considered to be less theoretically robust than approaches based on incremental (or decremental) costs. This section highlights a range of regulatory precedent, from both the postal sector and other UK regulated sectors, to illustrate how and where LRIC-based approaches have been adopted.

3.1 Postal sector

3.1.1 United States Postal Service

The USPS has developed a sophisticated approach to assessing the incremental costs of different postal products—defined as ‘the reduction in cost from the firm’s no longer producing good X, all other things remained unchanged’.¹⁰ This is used as the primary pricing tool in setting tariffs. In the context of assessing Royal Mail’s own class costing proposal, this example is highly significant and it is therefore worth setting out in detail the approach used.¹¹

The activities of the USPS are divided along the ‘pipeline’ and across the (31) different products, which can in turn be aggregated into seven categories. The value chain is divided into several components; in the simplest case, there are four components (retail cost, transportation cost, mail processing cost and delivery cost).¹² For each component, a cost driver is identified. For example, for transportation, the cost driver is taken as being the number of cubic foot miles required to transport the mail; in mail processing, it is the number of sortations required to get each piece en route. The links between the volumes delivered and the cost driver, and between the cost driver and actual costs, are then estimated econometrically. From this stage, incremental costs are estimated using a three-stage process:

- the amount of cost driver associated with each product, for each component, is estimated, through a decremental approach—ie, by estimating the reduction in the driver that would take place if a product were no longer produced’;
- in the second stage, any product-specific fixed costs in each of the four components are estimated. In general, these are not found to represent a significant proportion of each product’s costs, except for expedited products (priority and express mail), for which the product-specific costs are 15% and 39% of incremental costs respectively;
- the costs identified for each product for each component are summed across the four components, to give the incremental cost for each product.

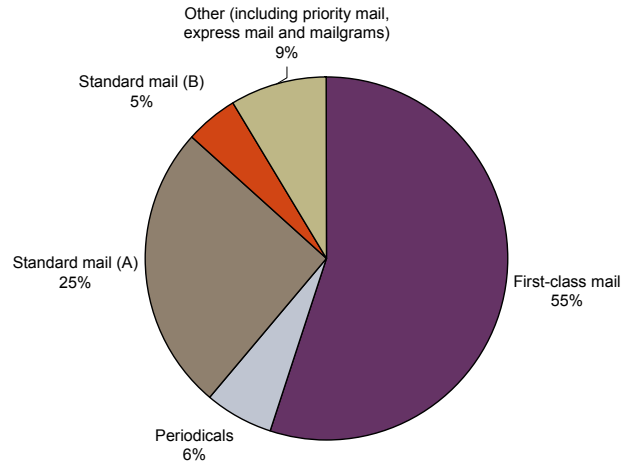
It is interesting to observe the results of this exercise across the groups of product (as of 1997), see Figure 3.1 below.

¹⁰ Bradley, M., Colvin, J. and Panzar, J. (1999), ‘On Setting Prices and Testing Cross-Subsidy with Accounting Data’, *Journal of Regulatory Economics*, 16: 83–100.

¹¹ Taken from Bradley et al (1999), op cit., and USPS (2004), ‘Appendix 1: Calculating Postal Product Costs: Incremental Costs’.

¹² In reality, these are further sub-divided.

Figure 3.1 Incremental costs for USPS postal product groups



Source: Bradley et al (1999), op. cit.

It is interesting to note that the incremental costs for first-class mail account for 55% of the identified incremental costs in this example.

It is clear that this represents an important instance in which a LRIC-type methodology has been explicitly used within the postal sector, demonstrating that such an approach is feasible, despite the fact that ‘the procedures are far removed from fully allocated costing procedure’. Moreover, it has many of the theoretical advantages associated with such a costing/pricing approach discussed in the previous section. As Bradley et al (1999) noted:

It has long been recognised in the economics literature that there are important differences between accounting costs and true economics costs ... [as such] ... accounting costs are treated with some scepticism in regulatory economics.

However, while this is of considerable interest, some methodological concerns have been expressed regarding estimation of incremental costs in this way. For example, Crew and Kleindorfer (2000) observed that:

From an economic perspective, the key issue in estimating incremental cost is verifying the form of the assumed cost function. Verifying this is difficult, since one typically obtains information only for vectors M for which all products have $M_i > 0$ (and often M_i will be substantially greater than zero.) Using such estimated cost functions to determine what total costs would be with some M_i ‘zeroed out’ is of course problematical.¹³

The authors subsequently discussed further studies:

that point to the special problem of estimating incremental costs which involve information about the cost function beyond the local and small changes in output levels as is the case with marginal costs. While process-management approaches, notably ABC, provide some insights into the associated cost estimation problems, the information requirements of actual estimation remain an open research question.

¹³ Crew, M. and Kleindorfer, P. (2000), ‘Cost Estimation and Economically Efficient Prices’, in M. Crew and P. Kleindorfer (eds), *Current Directions in Postal Reform*, Kluwer Academic Publishers.

Nonetheless, the fact that this incremental (decremental) cost approach has been fully incorporated into the pricing approach developed by the USPS is significant in the context of Royal Mail's class costing proposals.

3.1.2 European competition law precedent

A further interesting precedent on the use of a LRIC-based approach in the postal sector is provided by the European Commission decision on an allegation of predatory pricing made against Deutsche Post by UPS.¹⁴ In reaching a decision on this case, the Commission stated that it was necessary to establish whether the price charged by Deutsche Post for the delivery of mail-order parcels was below the incremental cost of that service. The Commission defines incremental costs as:

Costs that are attributable to a specific service ... those costs, which are dependent on the volume posted and arise solely as a function of the specific service, [and which] **cease to exist if the service at issue is stopped.** [emphasis added]

A definition along these lines is very close in nature to a TSLRIC definition, which, as discussed above, can also be defined or explained as the costs that a company would save if it no longer offered a particular service.

Moreover, the Commission provides considerable detail as to exactly how it calculated the appropriate incremental cost in this context. Specifically, on a step-by-step basis, it went through each part of the delivery process, seeking to ascertain precisely which costs would no longer be incurred if the mail-order parcel service (as one of three parcel services) were no longer provided by Deutsche Post. It is worth stating in full the conclusion, and arguments that led to this conclusion, for each stage of the value chain in this regard. This is provided below.

- *Collection*—since mail-order parcels were collected directly by Deutsche Post from specific customer premises (rather than being collated by the Post Office Network), the Commission argued that all these costs were incremental to the mail-order parcel service.
- *Sorting*—the Commission argued that the capital costs of setting up 33 inward and outward freight centres could not be attributed to a particular service. However, it did believe that all staffing and equipment costs at the centre were entirely dependent on the volume of parcels to be conveyed, and hence were allocated in direct proportion to the mail-order service.
- *Long-distance transport*—under the Postal Universal Service Ordinance, Deutsche Post is required to deliver 80% of parcels handled in any one working day by the second following day. This would be required for counter parcels even if a mail-order service were no longer provided; as such, the Commission argued that the staffing, equipment and capital costs could not be attributed to a particular service.
- *Regional and local transport*—the Commission recognised that no longer providing a mail-order service would lead to a drop in volumes, allowing some delivery points to be amalgamated. The Commission argued that this would lead to about 50% of these costs being saved.

¹⁴ European Commission (2001), Case Comp/ 35.141—Deutsche Post AG.

- *Delivery*—the Commission distinguished between ‘driving’ and ‘delivery proper’, arguing that the time allocated to driving was not service-specific, but that ‘delivery proper’ was mostly attributable to a specific service, since:

If a large volume service where as a rule only one parcel is delivered when the delivery vehicle stops (as in the case of mail order services) is discontinued, the cost of the delivery can be attributed to the specific service and saved in its entirety if the particular stop is no longer necessary.

The key issue emerging from this is that, to use a LRIC-related concept (the Commission never itself refers to the approach as a LRIC approach, despite the clear conceptual similarities with how LRIC has been defined elsewhere), the Commission did not consider it necessary to develop a fully specified, bottom-up engineering assessment as to the incremental costs of mail-order parcel delivery. Instead, it developed an ‘ad hoc’ approach, considering each part of the mail network in turn.

3.2 Telecoms

3.2.1 BT (1997)

Following extensive consultation, Oftel moved in 1997 towards a LRIC-based price control for the setting of BT’s interconnection charges. Previously, interconnection charges had been set on the basis of FAC using the HCA convention. However, Oftel wanted to move away from this because, using this approach, ‘interconnection charges are not based on an appropriate set of economic principles’.¹⁵ Incremental cost pricing was preferred due to economic efficiency, as long as a robust methodology was designed and implemented.

Two approaches to this were discussed in the consultation:¹⁶

- a bottom-up approach developed by the Incremental Cost Working Group, which sought to identify the generic costs of a network providing conveyance and access. This was calculated on a theoretical basis assuming that BT is run efficiently;
- a top-down model developed by BT, based on the actual costs of interconnection to BT.

The final assessment took account of the outcomes from both of the models, acknowledging that they both had advantages and disadvantages. Oftel investigated both models by individual component to account for the discrepancies between the two models, to reach a point where the final difference was mostly due to efficiency factors which were then fed into the value of the X factor.¹⁷

Ofcom is currently undertaking a consultation regarding network charge controls. It is seeking to determine whether LRIC-based prices should continue to be used or whether current-cost accounting with fully allocated costs (CCA FAC) should be introduced. The main shortcoming of LRIC cited by Ofcom in the consultation is that it:

involves a time consuming operation which BT carries out on an irregular basis, usually in developing price controls. Ofcom has little visibility of how BT generates these costs from its LRIC model, and this extra iteration by BT of its financial data is not subject to

¹⁵ Oftel (1994), ‘A Framework for Effective Competition—A Consultative Document of the Future of Interconnection and Related Issues’, December.

¹⁶ Oftel (1996), ‘Pricing of Telecommunications Services from 1997—Second Consultative Document on BT Price Controls and Interconnection Charging’, March.

¹⁷ Oftel (1996), ‘Pricing of the Telecommunications Services from 1997, Oftel’s Proposals for Price Control and Fair Trading’, June, section 4.57.

external audit scrutiny. Performance monitoring on a LRIC basis against BT's actual financial performance is not straightforward as routinely prepared wholesale service profitability information is prepared on a CCA FAC basis. By contrast, CCA FAC uses data that can be reconciled to the regulatory financial statements, which have been audited and are in the public domain.¹⁸

Thus, in Ofcom's opinion, the main shortcoming of the LRIC model relates to asymmetry of information, not the economic principles of the model. Ofcom's final determinations on this have not been published, so it is not yet clear what form of pricing/costing will be taken by BT in future.

3.2.2 Mobile call termination

The mobile networks were referred to the Competition Commission by the Director General of Telecommunications (the DG) in January 2002 under Section 13 of the Telecommunications Act 1984 for excessive levels of charges for mobile call termination. The Commission published the results of its inquiries in February 2003. This investigation found that call termination charges were neither cost-reflective nor competitive, and thus needed to be regulated. The Commission recommended that 'termination charges should in principle be cost-reflective and that the most appropriate method for determining the costs of termination was long-run incremental costs'.

The DG used a bottom-up LRIC model that estimated the cost of building a 'reasonably efficient' 2G mobile network. This model was subsequently developed and used by the Competition Commission. The LRIC approach was justified as the Commission saw no benefit to consumers from having prices above costs for call termination, and considered that LRIC was 'both right and fair, because it attributes costs on the basis of who causes, or benefits from, them.'¹⁹

The costing methodology was reassessed in the consultation on wholesale mobile voice call termination, completed by Ofcom in February 2004, which concluded:

the most appropriate and economically efficient basis for regulatory charge controls is forward-looking LRIC. The LRIC of voice termination is the additional cost an MNO incurs to provide termination. This can also be seen as the cost that the firm would avoid if it decided not to provide voice termination, taking a long-run perspective. It corresponds more closely to the charges that would prevail in an effectively competitive market than accounting-based measures of cost. It is a fundamental goal of price regulation to mimic the effects of a competitive market and this consideration underpins the use of LRIC.²⁰

3.3 Gas/electricity

3.3.1 Electricity distribution

Ofgem does not use LRIC-based approaches in the electricity distribution sector to determine revenues, but as a means to distribute costs across the various functions of the network. The distribution network operators (DNOs) are set a revenue allowance for the price control period and use distribution use of system (DUoS) charges, which determine an

¹⁸ Ofcom (2005), 'Review of BT's Network Charge Controls—Explanatory Statement and Notification of Proposals on BT's SMP Status and Charge Controls in Narrowband Wholesale Markets', March.

¹⁹ Competition Commission (2002), 'Vodafone, O2, Orange and T-Mobile: Reports on References under Section 13 of the Telecommunications Act 1984 on the Charges made by Vodafone, O2, Orange and T-Mobile for Terminating Calls from Fixed and Mobile Networks', December.

²⁰ Ofcom (2004), 'Statement on Wholesale Mobile Voice Call Termination', February.

appropriate cost-recovery split between consumer groups to give cost-reflective charges that are scaled such that the DNO recovers its allowed revenue. DUoS charges are currently in a transitional period, as Ofgem seeks to harmonise methodologies across the DNOs. Interim methodologies, approved for each individual DNO, are in place at present, for which harmonisation was not required, although, in principle, the charges must not 'restrict, distort or prevent competition' and must reflect 'the costs incurred by the licensee in its distribution business.'²¹ The interim methodologies will be in place until the ongoing consultation is completed by Ofgem and a unified methodology is introduced.

To assess long-run incremental capacity costs, most DNOs use the distribution reinforcement model (DRM), formulated by the Electricity Council in 1984. The model estimates the capacity cost of accommodating a postulated increment in the simultaneous maximum demand met at each voltage level of 500MW. Thus, it is an approach to incremental costing where (potential) future increases in demand are used as the increment rather than the entirety of the current level of output. However, at present, no locality adjustments are made, partly to simplify the modelling, but also as a socially desirably cross-subsidy, such that urban and rural customers pay the same charges, although 'the costs of supplying rural customers are generally higher than those of urban'.²²

As part of the consultation, Ofgem commissioned three papers, published in March 2005, from academics, which advocated some form of LRIC-based approach to costing. Strbac and Mutale (2005) discussed the DRM and investment-cost-related network pricing (ICRP) (see below). However, they based their recommendation on the reference network concept, a bottom-up LRIC approach that 'builds' an efficient network and then uses this reference network to estimate the costs of incremental supply. Turvey (2005) looked at the benefits of the LRIC methodology, and determined that it would be appropriate to use, but recommended a top-down approach and noted that limitations arise due to the use of company estimates as part of the DRM.²³ Jamasb et al (2005) also advocated a strong case for the use of LRIC, but suggested that the Electricity Council (referred to as the Electricity Association in the paper) methodology should be updated to take into account locational factors, especially in generation.²⁴

Ofgem is planning to continue the consultation throughout 2005, with no confirmed conclusion date. However, LRIC is already used by several DNOs and has been endorsed to a degree by all three academic papers, with the most recent consultation document stating that:

Use of System (UoS) charges for demand and generation regimes should be fully aligned with UoS charges established via charging models based on forward looking long run incremental cost (LRIC).²⁵

3.3.2 Electricity transmission

Electricity transmission follows a similar structure to that which applies to the DNOs. Use-of-system charges are set by National Grid Company (NGC), which is required to publish its methodology for charge calculations prior to price reviews. These charges are subsequently combined with their revenue allowance to split the costs of the network between the users on

²¹ Ofgem (2004), 'Structure of Electricity Distribution Charges—Consultation Paper: Proposed DNO Charging Methodology Statements', October.

²² Strbac, G. and Mutale, J. (2005), 'Framework and Methodology for Pricing of Distribution Networks with Distributed Generation', March.

²³ Turvey, R. (2005), 'Longer Term Electricity Distribution Charging Framework', March.

²⁴ Jamasb, T., Neuhoff, K., Newbery, D. and Pollitt, M. (2005), 'Long-Term Framework for Electricity Distribution Access Charges', report prepared for and commissioned by Ofgem, March.

²⁵ Ofgem (2005), 'Structure of Electricity Distribution Charges, Consultation on the Longer Term Charging Framework', May.

a fair and cost-reflective basis. Use-of-system charges are based on the ICRP methodology, originally introduced in 1993/94 for England and Wales. This calculates the marginal costs of investment in the transmission system that would be required as a consequence of an increase in demand or generation at each connection point or node on the transmission system. Thus, the ICRP calculates the marginal costs of investment in terms of megawatt kilometres for different zones, including an allowance for a locational security factor (which takes into account the requirement to be secure against a set of worst-case contingencies in terms of maximum flow for each circuit). Ofgem has approved this pricing system due to its cost-reflective nature and because it provides clear and efficient signals to the market in the long run.²⁶

3.3.3 Gas transmission—National Transmission System

Transco operates the National Transmission System (NTS) under the terms of the NTS Gas Transporter Licence. One condition of this licence requires Transco to establish a methodology showing the methods and principles on which transportation charges are based, to improve transparency. Charges for the transmission operation part of the business are determined by the price controls and are collected through entry and exit capacity charges, with a fixed exit charge and the entry charge determined by an auction process.

Exit capacity charges are set to reflect the LRIC of 'reinforcing the system to transport additional gas between entry and exit points'. The charges are calculated using the Transcost model, which calculates the investment cost of providing an extra increment of supply for a specific exit zone. From this, the revenue requirement for a particular exit zone over the life of the asset is calculated and discounted. This total discounted cost is then divided by the total discounted volume, giving a value of LRIC for a specific exit point. The model raises some interesting points relating to the use of LRIC pricing.

- **Size of increment**—if the increment is too small, the LRIC will tend to zero, whereas if they are too large, they will tend to a distance-related charge, which is undesirable. The chosen increment (2.834 million cubic metres per day) represents around 10% of the flow along a route, although Transcost is configured such that the increment can be changed as appropriate.
- **Aggregation into exit zones**—although the network could be divided into an infinite number of increments, the NTS exit points, which deliver gas into the local transmission system, are grouped into 33 exit zones for charging purposes. This is designed to:
 - reduce the number of individual charges;
 - reflect areas with common reinforcement cost drivers;
 - reflect actual system operation—the gas supplied to a specific area within an LDZ can often be routed through a number of NTS exit points.

LRIC is also used to determine system entry capacity, albeit with a different increment, as a means of setting baseline values for entry capacity auctions. The LRIC values are used to find the unit cost allowance, which is then used as a minimum price in the auctioning of entry capacity.

3.3.4 Gas distribution networks

The gas distribution networks (DNs) are currently undergoing a period of transition, with the 12 local distribution zones (LDZs) having being consolidated into eight gas DNs and with

²⁶ Ofgem (2005), 'NGC's Proposed GB Electricity Transmission Use of System Charging Methodology—The Authority's Decisions', March.

Transco recently undertaking the sale of four of these DNs. Thus, a consultation is ongoing regarding how to regulate the DNs in future. The price control reviews set an allowed level of revenue for the DNs, which must be divided across the customer base using a costing methodology. In the past, the LDZs have used a methodology based on ABC analysis, which was used to derive FAC/FDC and thus split the costs between customers. However, Ofgem claimed that this had several shortcomings, for example:

- it bases charges on customer size bands, which are therefore averaged across customers with significantly different characteristics. This method therefore does not impose the actual costs of gas transportation on the types of customer responsible for them;
- failure to provide correct economic signals, as charges reflect past accounting costs rather than long-run marginal costs or forward-looking incremental costs. This results in some prices being above and others below marginal cost;
- lack of transparency due to the absence of a clear relationship between marginal cost pricing and the functions used to determine charges, and the complexity of the previous system made it difficult for customers to understand.²⁷

Ofgem favoured a system of forward-looking incremental costs that are:

the additional costs that would be imposed if a particular customer or group of customers decided to use the system or decided to flow a specified increment of gas through the system.

The key benefits of cost-reflective charges were seen to be efficient pricing outcome in the long run and clear signals for efficient investment, as decisions are based on true costs. Thus, LRIC-based costing was put in place for the LDZs until their amalgamation into the DNs. The current review is seeking to define a methodology for the DNs that is cost-reflective and economically efficient.²⁸

The initial indications are that a LRIC-based approach will continue to be used. In particular, Ofgem has developed an 'Economic Test'—a financial assessment tool used to identify whether a new load should pay a contribution towards the reinforcement required for its connection, to prevent existing DN customers from subsidising the reinforcement costs of a new load. The Economic Test compares the incremental cost of connecting a customer to the gas distribution network with the expected revenue from transportation charges associated with that customer.

However, the future treatment of costs will not be clear until Ofgem publishes its final proposals in December 2005, for implementation in April 2006.

3.4 Aviation

During the most recent review of BAA's regulated airports (specifically Heathrow), the CAA suggested developing a LRIC-based costing (and pricing) concept. In this case, the increment considered was that of the construction of Terminal 5; thus, the appropriate price derived was calculated through the sum of the operating and capital costs of the construction and operation of this increment over a period of 20 years, divided by the incremental passengers that the terminal would bring. In advocating this methodology, the CAA stated that:

²⁷ Ofgem (2000), 'Review of Transco's LDZ Charging Methodology: A Consultation Document', March.

²⁸ Ofgem (2005), 'Structure of Gas Distribution Charges, Initial Proposals', July.

It makes explicit the high incremental costs of additional capacity and therefore acts as a better signal for the costs of new capacity than under a standard asset base [ie, average cost] approach. While providing sharper investment incentives, it provides for a simpler and less intrusive form of regulation than the standard RAB approach. The CAA believes that the commitment is no less credible than a standard RAB approach, and in many ways is more credible. It therefore provides for a stable basis for capacity investment.²⁹

However, this approach is not without its problems. In particular, in this context, airlines were concerned that the approach would imply significant increases in prices in the short run, as the incremental costs of the provision of Terminal 5 were significantly greater than the average costs of provision of the existing airport facilities. However, in another context, if the LRIC of providing additional output were lower than the current average costs (ie, relatively little new investment was involved in increasing output), setting prices according to the approach would not allow for the full recovery of previously sunk investment. Concerns such as these led the Competition Commission to abandon this approach in favour of a standard RAB-based approach.

3.5 Water

Long-run marginal costs (LRMC) are used for the regulation of water and sewerage companies (WASCs) as a reference point for companies and Ofwat in the setting of price controls. This is a very similar concept to LRIC, looking at the cost of providing an extra unit of supply in the long run, when all inputs can vary. However, LRMC estimates are used in the regulation in the water sector in a number of areas.

- The volumetric element of two-part tariffs for metered customers must be based on LRMC estimates, although the link need not be ‘mechanistic’. This link is required as it is ‘considered to be consistent with a long term least cost approach to balancing supply and demand, and with companies duties to promote the efficient use of water by customers.’³⁰
- By contrast, for large-user tariffs, Ofwat requires that volumetric rates reflect LRMC ‘as closely as possible’, while if the regulator needs to determine the terms for bulk supplies, it has stated that LRMC ‘will be a key reference point’. Ofwat has also indicated that LRMC estimates could be used in determining the appropriate common carriage tariffs.³¹
- In their business plans, companies are required to demonstrate that, in maintaining or improving the supply/demand balance of water resources, the LRMC of their proposed policy (eg, through metering or leakage control) is less than the current LRMC estimate of acquiring additional water resources.

Water companies use two main methodologies. Most take an average incremental cost approach, which forecasts demands and optimises supply such that costs are minimised in the long run. However, there is also the less widely used perturbation approach, which is more explicitly concerned with decision-making at the margin, considering the change in

²⁹ CAA (2002), ‘Heathrow, Gatwick and Stansted Airports’ Price Caps: CAA Recommendations to the Competition Commission’, February.

³⁰ Ofwat (2000), ‘Report A: The role of LRMC in the provision and regulation of water services’, MD170: Letter to Managing Directors, February 11th.

³¹ Common carriage refers to the transportation of one company’s water supply through another company’s pipes.

forecast future system costs arising from a permanent increment or decrement in the forecast pattern of future demand.³²

³² Ofwat (2000), 'Report C: Guidance on LRMC Estimation', MD170: Letter to Managing Directors, February 11th.

4 Theoretical issues surrounding Royal Mail's class costing approach

4.1 Options for class costing within Royal Mail

The aim of Royal Mail's class costing exercise is to identify the costs that might be appropriately associated with the different classes of service that it offers (particularly its first-class service). An early version of the class costing approach, which captures its key features, described class costing as consisting of the following two-step process.

1. To assess the costs of an operation where all the first-class volume is, instead, second class and to ascribe the difference to first-class; followed by
2. To assess the costs of an operation where all the volume is third class and to ascribe the cost difference between (1) and (2) to first and second class on the basis of relative volume.

As is explored further in Appendix 1, it can be seen that, under certain simplifying assumptions, this approach appears to involve finding the difference in marginal costs between the first- and second-class mail and the increment of fixed costs associated with providing an additional first-class service.

4.2 Theoretical validity

As discussed above, for various theoretical reasons, approaches to assessing the costs of an activity according to its (long-run) incremental costs have become increasingly popular in recent years, in both the postal service and other regulated sectors. The essence of these approaches has been to assess the costs that would be incurred (avoided) by considering a specified increment (decrement) of that output. Most frequently, particularly in the postal and telecoms sector, the increment (decrement) considered has been the entirety of a particularly service, and it is often the 'decrement' approach that has been implemented.

It can be seen that Royal Mail's option outlined in the previous section bears many similarities to this type of costing methodology. In particular, a 'typical' (long-run) incremental cost approach and Royal Mail's class costing methodology both seek to answer the following question:

- what costs would be avoided if Royal Mail no longer had to provide a particular (in this case, first-class) service?

In other words, Royal Mail's class costing approach has, in principle, many of the properties, and hence many of the advantages, associated with a LRIC estimate.

However, as Royal Mail extends its class costing methodology, it will need to consider several key issues that will affect the extent to which LRIC-type principles are reflected in its final proposals.

- 1) The option outlined above envisages estimating the costs that would be saved if all existing first-class mail switched to the second-class service. In other words, only the 'service-level' effect of the first-class service is considered, with no volume effect. By contrast, in most other incremental-cost-type approaches, there is an (implicit) assumption that none of the volume is switched. This is seen most clearly in the USPS case study where, in a very similar context, the incremental costs are calculated as all the costs associated with the provision of a particular volume of a particular class of

mail. This approach, in conventional contexts, has a clear rationale—it allocates the costs being incurred *today* most closely to the services that are causing those costs to be incurred, minimising the size of the residual pool of costs that need to be allocated in a more arbitrary manner in order to achieve full cost recovery.

A further alternative that Royal Mail could investigate would be to consider what would be the likely proportion of first-class mail that would switch to second-class mail if the first-class mail service were no longer provided.

- 2) It is not clear to what extent Royal Mail is considering seeking to evaluate substantial network redesign as part of undertaking the exercise examining the counterfactual. However, it is unlikely that this would be appropriate, at least in any substantial way.
 - First, as was discussed in the section on postal precedents, determining what a hypothetical network would look like without the presence of one of the main service types is inherently unclear.
 - Second, it must be considered what the purpose of the class costing exercise is: to allocate the existing costs of the Royal Mail network across the different service types in a more economically meaningful way. It is not clear that this would be achieved by an approach that focused on hypothetical network redesign.
- 3) In the methodology described above, the approach taken towards analysing the costs of the second- and third-class service is somewhat different from that taken towards assessing the first-class service costs.

To assess the costs of an operation where all the volume is third class and to ascribe the cost difference between (1) and (2) to first and second class on the basis of relative volume.'

This seems somewhat removed from the conventional approach, particularly as the cost savings associated with the counterfactual exercise would then be allocated on the basis of initial volumes, losing many of the advantages regarding cost-reflectivity. It is also much more difficult to envisage what precisely the third-class service would look like. A more conventional approach would be to consider the cost savings associated with the removal of each of the services in turn, thereby acquiring an incremental cost estimate for each of the three classes

- 4) Royal Mail's identified option is a decremental one: it involves assessing the costs that would be saved if the first-class service were no longer provided. Although this is the most common way in which an incremental cost estimate is estimated, in the presence of sunk costs, the two approaches would not, at least in principle, be identical.
- 5) Even when the incremental costs of each of Royal Mail's classes have been estimated, a residual pool of joint and common costs is likely to remain. As the proposals are developed, Royal Mail needs to consider how these costs will be allocated across the different classes. In doing this, it would be desirable, at least in principle, to recognise the distinction between joint and common costs.

5 Class costing modelling approaches

The previous section considered a range of theoretical issues surrounding the development of Royal Mail's class costing proposals. The purpose of this section is to consider briefly the modelling approaches available to Royal Mail as it develops its class costing proposals.

It is possible to place the possible modelling approaches to class costing into three broad categories.

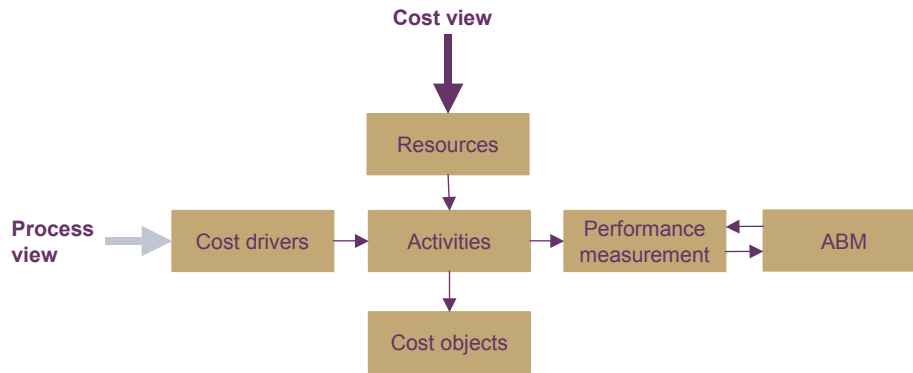
- Currently, class costing is treated as an extension to the ABC system within Royal Mail, whereby the allocation of costs includes 'incremental' principles that are intended to reflect certain activities or costs only arising in the provision of the first-class service. This corresponds to the first tier of class costing development, namely an attempt to allocate existing costs to reflect causality.
- Further development has to recognise the degree to which ABC systems can be relied on to calculate incremental costs accurately, and to answer, rather than support, cost-allocation questions in areas where it is not possible to establish or even to suggest the causality of costs. In particular, it should be borne in mind that other attempts at developing an incremental cost methodology, particularly the European Commission precedent referred to above, have done so in a relatively ad hoc fashion. As such, there are several ways in which Royal Mail could build on its modelling approach to class costing in the short term. This represents the 'second tier', whereby an explicit attempt could be made to consider the operational principles that would be adopted in the absence of a particular service
- Finally, in the longer term, there may be advantages in developing a stand-alone model that seeks to estimate the full cost of providing a particular class of service, potentially by considering how the network itself would be configured in the absence of a particular service. This represents the third tier of the three-tier approach to class costing.

This section considers these three 'tiers' to modeling class costing, beginning with a review of Royal Mail's ABC system, which underpins its current approach to class costing.

5.1 Royal Mail's ABC system

In its documentation on its class costing system, Royal Mail summarises the principles of its ABC system in a diagram, reproduced as Figure 5.1 below.

Figure 5.1 Royal Mail's ABC system



Note: ABM, activity-based management; this aims to provide a systematic approach for the management of organisations.

Source: Material provided to Oxera by Royal Mail.

This is recognisable as the CAM-I cross—the summary of the industry standard approach to ABC (see Figure 2.1 above). With one exception (the modifications used to support class costing), the Royal Mail system is entirely conventional.

The data management is supported by three modules.

- **Resource module**—this receives the expenditure recorded in the general ledger, summarised to a level to give pools of expenditure that can be related to the activities they support (business areas and cost types).
- **Activity module**—this contains a defined set of activities for the business for which there is a method to attribute the resource costs. Significantly, some activities (eg, ‘inward secondary sort letters’) are split at the activity definition stage into two categories: ‘unclassified’, being the proportion of the activity attributable to both first- and second-class mail; and ‘classified’, being the proportion of the activity attributable to first-class alone on account of the higher specification for the first-class service. This unusual feature is amplified below.
- **Cost object module**—this module allocates costs to products.

Costs are allocated from the resource module to the activity module by resource drivers; namely RCS hours, vehicle hours, building square metres, machine hours, and direct.

Costs are then allocated from the activity module to the cost object module by means of activity drivers, based on a routing matrix. However, some activities are not included in the routing matrix, such as those that are product-specific (eg, mailroom services), have a non-traffic driver or are non-pipeline activities (eg, marketing).

The routing matrix models the flow of mail through the product pipeline process (via around 100 routes), by considering handling characteristics such as size and payment method to reflect traffic through operational processes:

- by format (eg, letter, flat, packet);
- by class;
- by handling (eg, mechanical or manual);
- by payment method.

Activity drivers are predominantly based on sales product volumes.

The costs themselves are extracted from the general ledger and divided into a number of types, such as staff, accommodation and vehicles. Where costs have a common resource driver, for allocation to activities, they are 'pooled' for ease of computation.

In terms of scale, in 2004/05 the ABC system used 340 activities, to allocate £6,470m, divided as shown in Table 5.1.

Table 5.1 Allocation of costs in Royal Mail's ABC system

Category	Number of activities	Costs, 2004/05 (£m)
International Business Unit	11	247
HWDC (Heathrow Worldwide Distribution Centre)	42	28
Logistics Services	75	489
Letters Operations (Service Delivery)	151	5,067
Marketing and other Letters overheads	58	439
Royal Mail Group overheads	3	202
Total	340	6,470

Source: Royal Mail.

Royal Mail's ABC system is therefore one of the more comprehensive systems operating within the UK at present.

5.1.1 Outputs from the ABC system

The primary purpose of the ABC system is to report on product and process costs, which can be reported in three forms:

- FAC, where all costs are allocated to products and processes;
- attributable costs, defined as 'the assignment of cost attributable (belonging to) to an activity or a cost object using an observable measure of the consumption of resources by an activity';
- LRMC, which is defined by Royal Mail as 'the least cost method of producing one more unit of output allowing for the optimisation of all inputs, everything else being equal.' (As such, with its focus of examining one additional unit of output, it is an output that differs significantly from the incremental type costs being sought under the class costing approach.)

These reported costs will all be influenced by the class costing principles that Royal Mail has built into the system, as described below.

5.1.2 Summary of the ABC system

With the exception of the class costing aspects, Royal Mail's ABC system conforms to the industry standard for such systems, as articulated by the CAM-I. It is unusual in size (being particularly large) and in being able to report on attributable and LRMC costs, as well as FAC.

5.2 Class costing within the ABC system

In ABC systems, it is normal practice to allocate costs to activities before any consideration of how activity costs will be subsequently allocated to cost objects (products, such as first- or second-class mail). However, Royal Mail is aware that certain aspects of its network only exist for the provision of the first-class service and certain types of cost are incurred (or incurred at a higher level) because of the provision of that service. Therefore, certain activities are divided into *classed* and *unclassed* parts prior to the allocation of resources to

the activities, with the activity cost of the classed activities being assigned to the first-class service.

Regarding the cost types, the following adjustments have been made.

- Shift payments:
 - paid for attending between 8pm and 5am;
 - attributed to first-class due to overnight processing requirement.
- Accommodation:
 - first-class specification drives the number and size of operational sites;
 - 67% of Mail Centre accommodation costs attributed to first-class;
 - 67% based on the ‘operational time window’ available to first-class compared with second-class;
 - accommodation costs for manual activities split on average 80% to first-class, reflecting traffic mix and operating time window.
- Machine idle time costs attributed to first-class only (including export mail for outward Mail Centres);
 - some machine capacity (ie, numbers of machines);
 - air network costs;
 - Sunday collections.

The adjustment to cost types is similar in principle to the identification and isolation of ‘classed’ activities; namely to isolate those costs that are only incurred for the benefit of the first-class service.

5.2.1 **Assessment of class costing modelling approach**

The adaptation of the ABC system to include incremental costing approaches does address the need to reflect causality in the allocation of costs:

- the routing matrix contains data on the variable costs of first- and second-class mail, insofar as they require different handling;
- attempts have been made to identify the activity costs and cost types that are incremental to the first-class service.

The ABC system is therefore consistent with the class costing principles as defined by Royal Mail. However, it is not clear that all the incremental costs of providing a first-class service have been identified, and a more detailed review of the network costs may yield further costs that could be attributed to first-class (eg, some additional capacity costs).

More fundamentally, the ABC system is an advanced means of allocating costs to reflect causality, as far as possible, and was not designed to answer the ‘what if?’ question implicit in the class costing approach—ie, ‘What would be the cost reduction if a certain service class was no longer provided?’ While a directionally correct answer has been provided to this question by modifying the cost-allocation principles to account for first-class increments, the ABC system was not designed to provide a robust answer to the key question.

The ‘what if?’ analysis could be undertaken by considering what the costs would be:

- given the current network but different operating principles, perhaps considering the impact on broad categories of cost within the pipeline and overhead structures (the second tier defined in the previous section);

- if the number of Mail Centres, Delivery Offices and transportation arrangements were rationalised (the third tier defined in the previous section).

Additionally, it may be possible to enhance the existing approach to class costing by recognising the need to:

- consider capital costs;
- differentiate between joint and common costs;
- differentiate between step-fixed and fixed costs, as regards changes in service provision, in order to examine the issue of cost avoidability.

Ideally, however, there is a need for a stand-alone ‘what if?’ model that would draw on the data already existing within the ABC system and allow alternative operating (and possibly network design) scenarios to be costed, in order to predict the cost savings resulting from not having to provide a particular service.

5.3 Possible improvements to the class costing modelling approach in the short term

The purpose of this section is to consider ways in which Royal Mail could extend its existing modelling of class costing and which, if implemented appropriately, could be expected to provide directionally more appropriate costing answers in a relatively short space of time.

5.3.1 Alternative operating scenarios

A useful step in widening the scope of class costing would be to undertake a simple exercise to consider what would happen in the major cost categories if particular services were removed (ie, to consider a hypothetical operating schedule within the current network). This exercise could build on the approach adopted by the European Commission with regard to Deutsche Post referred to in section 3.1.2, which considered the possible cost savings in each part of the value chain following the removal of the service.

5.3.2 Cost avoidability

The existing ABC system considers scale-related issues by identifying the variability of costs in its calculation of LRMC (using a method similar to that adopted in the USPS class costing approach, which focuses on ‘volume-variable’ costs).

However, there may be an advantage in considering the degree to which certain costs are step-fixed and sensitive to changes in the scope of service provision, using the ‘attributable-cost’ feature of Royal Mail’s ABC system. (Attributable costs cease when all of the services that require activity are removed.)

Identification of the link between the avoidability of certain activity costs and the provision of specific services may increase the degree to which the incremental costs of providing a first-class service are recognised.

5.3.3 Capital costs

The principle of allocating capital costs to activities by means of capital drivers is well established, and, in some cases, this has been used to allow the calculation of economic profits for a firm’s products and customers.

Royal Mail already collects data on resource drivers that can plausibly be used as capital drivers for its main categories of assets (eg, property, vehicles). The extension of class costing to capital costs should therefore be relatively straightforward.

5.3.4 **Joint and common costs**

While the ABC approach originated in manufacturing and has been successfully used to allocate common costs between different products, it is not suitable for allocating joint costs. This did not pose a significant problem in the manufacturing industry. Where there was inevitable production of a secondary product, this was termed a 'by-product' and different costing principles applied.

Some of Royal Mail's costs are, however, joint. The example of collection has been cited, and a review of the activities within the ABC system may well provide further examples. At the least, it would be useful to recognise the distinction, even if joint costs are still allocated on an activity-driver basis until a better alternative is found (if such an alternative exists).

Theoretically, the allocation of joint costs requires recognition of the relative demand for products and an ABC system cannot provide this perspective, unless 'value' drivers, are used. (Royal Mail does not employ this approach, which is in any case imperfect, especially if the subsequent costs are used to set prices.)

The recognition of certain costs as being joint could lead to more costs being allocated to the first-class service.

5.4 **Potential longer-term approach**

The underlying approach to class costing within Royal Mail is to compare actual costs with those that would occur if a service were removed and if a proportion of the volume (varying from none to all) were transferred to other services.

In the longer term, potentially the most robust way to understand fully the implications of such an approach is to construct a stand-alone model explicitly examining this issue. This could include consideration of several network scenarios—for example, a different network may have a different number of Mail Centres, Delivery Offices and transportation arrangements—although the caveat regarding the extent to which consideration of extensive network redesign would be instructive in allocating existing network costs remains important. The supply chain modelling techniques for providing this insight are well established, and this exercise could yield both operational and regulatory benefits.

Appendix 1: Algebraic analysis of class costing approach

The analysis begins by assuming a simple pipeline with linear cost behaviour, where the cost of delivering second-class mail is assumed to be:

$$z = ax + b$$

where z is the cost and x is the volume.

The cost of delivering first-class mail is assumed to be:

$$z = cy + d$$

where z is the cost and y is the volume.

In practice c and d will be somewhat larger than a and b , respectively. It is possible to operate the two services within a single pipeline so that:

$$z = a'x + c'y + e_0 + e_x + e_y$$

where:

$$e = e_0 + e_x + e_y;$$

e_x is the increment of fixed cost associated with second-class mail;

e_y is the increment of fixed cost associated with first-class mail;

e_0 is the 'rump' of fixed cost left by *deducting* e_x and e_y from the total.

In practice, a' and c' will be slightly larger than a and c , respectively (due to the additional complexity of a pipeline that is required to handle the two types of service, not one). However, e will be substantially smaller than the sum of b and d , reflecting the economies of scope in combining the pipeline. Thus, in practice, it is worthwhile combining the pipelines.

In applying Royal Mail's approach to class costing, start with the status quo—ie, volumes of second and first-class mail equal to x_0 and y_0 respectively, with the cost being z_0 :

$$z_0 = a'x_0 + c'y_0 + e_0 + e_x + e_y$$

Then imagine 'the costs of an operation where all the first-class volume is, instead, second class'; this is defined as z_1 :

$$z_1 = a'(x_0 + y_0) + e_0 + e_x$$

Then 'ascribe the difference to first-class':

$$z_0 - z_1 = a'x_0 + c'y_0 + e_0 + e_x + e_y - a'(x_0 + y_0) - e_0 - e_x = y_0(c' - a') + e_y$$

The additional unit cost of first-class mail is $(c' - a') + (e_y \div y_0)$, or the difference in the marginal cost of the first- and second-class services, plus an allowance for unit cost of the service-specific fixed cost for first-class mail. (A similar exercise could be undertaken assuming that all mail is first-class, to obtain the cost discount for second-class mail.)

The result is crucial as it implies that this version of Royal Mail's class costing principles appear to involve finding the difference in marginal costs between the first- and second-class mail and the increment of fixed costs associated with providing an additional first-class service. This could arise through infrastructure differences, including:

- number of nodes (such as Mail Centres or Delivery Offices);
- internode transport (such as the use of air or road);
- spare (or idle) capacities (both machine and manual).

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