



Review of Australia Post's volume and input cost forecasts

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Executive Summary

Frontier Economics (Frontier) was engaged by the Australian Competition and Consumer Commission (ACCC) to provide it with an independent assessment of the demand and other inputs used by Australia Post in its July 2009 draft price notification. In this notification, Australia Post proposes to raise the price of certain ‘reserved services’ over which it has a statutory monopoly. We were asked by the ACCC to consider both Australia Post’s methodological forecasting practices as well as the forecasts themselves.

We provided the ACCC and Australia Post with a draft report in early October 2009 and received comments on our report from Australia Post. In this final report we have addressed these comments where they arise by specifying our draft views, Australia Post’s response, and our final view.

Our report contains three broad sections:

- In the first section (covering Chapters 1 and 2 of our report) we summarise the regulatory context, Australia Post’s volume forecasts and then analyse the general methodology by which Australia Post forecasts volumes.
- In the second section (Chapter 3-5), we analyse the particular forecasts for the different letter types and examine the expected forecasts against historical trends.
- In the third section (Chapter 6) we review the input cost forecasts.

In Chapter 7 we draw some conclusions from our review.

Regulatory context and forecasting methodology

In our draft report, we concluded that the building-block method by which the ACCC assesses Australia Post’s price notification gave Australia Post an incentive to under-forecast volumes. Therefore, there was a need to rigorously review the forecasts that have been adopted. However, we found that Australia Post’s methods for forecasting volumes were not amenable to a critical review. The forecasts were not based on a rigorous framework designed to produce accurate forecasts; rather, they evolve from commercial decision-making, and the various processes of derivation and review were not clearly and transparently documented. Nor were the forecasts amenable to sensitivity analysis on the key expected drivers of demand.

Although we recognised that the postal industry is currently experiencing very challenging market conditions, because of weaknesses in the forecasting methodology, we concluded that we should be sceptical of the Australia Post volume forecasts where they showed marked divergences from historical trends.

In responding to our draft report, Australia Post rejected the view that we should be sceptical of its forecasts, arguing that such an approach would ignore postal

industry realities; in particular, that the recent past is not a good indication of the future. It argues that if we wish to rely on long-term trends that we should demonstrate that long-term trends remain valid.

Our view is that the burden is on Australia Post to produce forecasts using an objective and reviewable methodology. Because it has not done that, we therefore analyse its forecasts against historical trends not because historical trends will always provide the most accurate indication of the future, but because otherwise we have a limited (or no) ability to critically analyse the forecasts at all.

The volume forecasts

We reviewed Australia Post's approach to forecasting mail volumes and supporting information provided by Australia Post's consultants, Diversified Specifics. This statistical work was not specifically designed for forecasting mail volumes, but was used to inform Australia Post about historical trends. However, ultimately this work was of limited value in reviewing Australia Post's forecasts because Australia Post did not rely on Diversified Specifics' analysis in a systematic way.

We then assessed Australia Post's forecasts against a set of benchmarks. The benchmarks are not intended to provide forecasts of mail volumes over the price notification period. Rather, they are intended as a guide to assess how Australia Post's forecasts compare to trends in the data.

Our analysis shows that Australia Post's forecasts of small and large letter segments deviate from volume projections based on historical trends (using both simpler trend methods and using exponential smoothing). For small pre-sort and both segments of large letters, Australia Post forecasts are below the historical trends, while its forecasts for small other letters are above the historical trends.

We assessed how Australia Post's forecast annual domestic reserve letter revenues deviated from those that might be expected if volumes followed the historical benchmarks. We conclude that the expected value of revenues using Australia Post's volumes forecasts is not materially different from the expected revenues using the historical benchmarks.

Input cost forecasts

We also examined Australia Post's input cost forecasts. Input cost forecasts (usually consisting of a quantity variable and a price variable, such as FTEs and wages to derive labour costs) are developed through internal budgeting processes. As for the analysis of volumes, this methodology makes the forecasts difficult to review, and we have consequently examined the forecasts primarily against historical trends. In broad terms, the cost forecasts are in line with historical trends. However, given the forecast declines in letter volumes, this is

problematic. It implies little to no relationship between the forecast lower volumes and Australia Post's expected costs.

Such an outcome would only be plausible if costs were completely inelastic to volume, and our reading of Australia Post's statements is that while much of the network cost is fixed due to the need to maintain regulated delivery standards, some cost savings are possible, particularly in the medium term. Overseas studies of delivery and sorting functions also indicate that while there are economies of density (that is, costs fall proportionally less than volumes), there should be some reduction in costs from lower volumes.

Conclusions

In conclusion, we find that Australia Post's demand and input cost forecasts are difficult to effectively analyse as they are not based on a methodology that is amenable to third-party review. Our analysis suggests that Australia Post's volume forecasts for small pre-sort and both large mail categories are below those that might be suggested by extrapolation of historical trends, and above trend for small other letters. Taken together, Australia Post's revenue forecast is not materially different from that which would be predicted using historical volume trends. Australia Post's input cost forecasts are also broadly in line with historical trends; however, these seem too high because they imply little ability to avoid costs in the face of falling volumes.

1 Introduction

Frontier has been engaged by the ACCC to provide it with an independent assessment of the demand and other inputs used by Australia Post in its July 2009 draft price notification.

The purpose of the consultancy is to critically assess the approach taken by Australia Post to forecasting future mail volumes, operating costs and other input data, and, if necessary, to supplement these forecasts with forecasts that are considered to better predict the likely volumes and costs of Australia Post in future years. This is further described in the abstract from the consultancy brief in the box below.

Box 1: Extract from consultancy brief

The ACCC expects that the consultant's report will include, for each data series:

- A detailed description of factors taken into account by Australia Post in generating its forecasts, including the methodology used by Australia Post to generate its forecasts.
- A critique of the factors taken into account in generating the forecasts, and the methodology used by Australia Post to generate the forecasts.
- The consultant's views on the appropriate forecasts for the period.¹

The consultant's critical assessment of Australia Post's volume, operating cost and other TFP inputs should consider:

- For volumes, consideration of the three diversified specific reports on demand – *Domestic Large Letter Volume Demand 1995/96 to 2007/08*, *Domestic Small Letter Segment Volume Demand, March 2009 Addendum*, and *The Impact of Economic Downturns on Income Elasticity of Demand PreSortBarcoded Small Letters*.
- Whether Australia Post's volume forecasts appropriately account for the impact of its proposed price changes.
- Consideration of whether Australia Post has appropriately accounted for the effect of reduced mail volumes on Australia Post's costs (i.e. consideration of the extent to which Australia Post's costs are volume variable).
- Consideration of the extent to which components of Australia Post's costs are forecast to change in accordance with relevant benchmarks, such as relevant labour cost benchmarks published by the ABS.

1.1 Background

On 24 July 2009, Australia Post provided the ACCC with a draft price notification proposal titled *Draft Notification, Change in Domestic Reserved Letter*

¹ For clarity, this did not necessarily mean that Frontier was obligated to produce new forecasts.

*Pricing - Detailed Explanation of Price Changes.*² This draft price notification outlines Australia Post's proposal to increase the prices of those letter services over which it has a statutory monopoly (reserved services). In particular, Australia Post is proposing to increase the basic postage rate by 5c to 60c, and to increase the prices of its reserved letter services by an average variation of 7.6 per cent on 2008 reserved service prices in early 2010.

Although Australia Post's reserved services extend to the collection, within Australia, of letters for delivery within Australia and the delivery of letters within Australia, there are a number of exceptions to Australia Post's reserved services. The two key exceptions are for letters weighing more than 250g, and letters that are carried for a charge more than four times the basic postage rate.

In order to increase the prices of its reserved letter services in accordance with the Trade Practices Act 1974 (the TPA), Australia Post must provide the ACCC with a locality notice specifying the proposed price increases, and receive a response from the ACCC stating that it has no objection to the proposed price increases, or price increases that are less than those proposed by Australia Post.

In support of its request for approval to increase the prices of its reserved letter services, Australia Post submitted a number of commissioned studies on mail volume demand and total factor productivity (TFP). The three reports submitted to the ACCC by Australia Post on factors affecting the demand for letters are authored by consultants Diversified Specifics:

- Domestic Large Letter Volume Demand 1995/96 to 2007/08.
- Domestic Small Letter Segment Volume Demand, Addendum 1996 to 2008, March 2009.
- The Impact of Economic Downturns on Income Elasticity of Demand PreSort Barcoded Small Letters.

Australia Post also submitted a report on its historical and forecast TFP performance, authored by Economic Insights and titled *Australia Post's Aggregate and Reserved Service Productivity – 2009 Update*.³

As Australia Post is seeking a price increase for services over which it has a monopoly, it is imperative that due consideration be given to the data and methodology employed by Australia Post in justifying the proposed price increases.

² Hereafter referred to as 'Draft notification'.

³ Economic Insights also supplied two other reports to the ACCC: *International benchmarking of postal service productivity*, and *Measuring The Allocation Of Australia Post's Reserved Service Dividend*. We were not asked to review these reports or the inputs that were used to produce these reports.

1.2 Process of review

Our primary task has been to assess whether the approaches taken to forecasting volumes and input costs by Australia Post is consistent with best practice for a regulated firm using a building-block pricing model.

In undertaking this task, we have:

- Reviewed the material on volumes and input costs in the Draft price notification and in Australia Post's corporate plan for 2009/10.
- Sent information requests to Australia Post to clarify aspects of the materials provided to us.
- Had a meeting with Australia Post and the ACCC to better understand Australia Post's forecasting methods.
- Reviewed the international literature on postal demand and costs.
- Conducted a review of the econometric techniques employed by Diversified Specifics to advise Australia Post about historical drivers of mail demand.
- Reviewed and analysed the following data:
 - Volume forecasts generated by Australia Post and reported in its Draft price notification and its post-tax revenue model (PTRM).
 - Volume, cost and quantity of input forecasts generated by Australia Post and supplied to Economic Insights for the purposes of producing a TFP study.
 - Input cost data used in the PTRM.
 - Data supplied by Diversified Specifics on drivers of mail demand.
- Provided Australia Post and the ACCC with a draft report for their comments.

In this final report, we record Australia Post's comments and our response to them.

1.3 This report

The remainder of this report is structured as follows:

- In Section 2, we examine Australia Post's general approach to forecasting volumes of reserved and other services.
- In Section 3, we focus on the small letter segment, and provide an analysis of the forecasts presented by Australia Post and supported with reference to consultant studies and other information.
- In Section 4, we undertake a similar analysis for large letter services.

- In Section 5, we analyse the potential impact of volume mis-forecasting on forecast revenues.
- In Section 6, we review the approach taken by Australia Post to forecasting cost inputs that form part of its submissions using a PTRM and that underlie the TFP analysis of its consultants.
- In Section 7, we draw some draft conclusions based on the analysis in the preceding sections of our report.

2 Volume forecasts

2.1 Introduction

As noted in Section 1, Australia Post's supply of reserved services is subject to price surveillance by the ACCC. In meeting its obligations, Australia Post has produced disaggregated financial details of its reserved and non-reserved services covering the financial years until 2011/12.

Australia Post uses a 'building block' model to show that its forecast revenues are no higher than its forecast costs over the modelled period. The forecast revenues are highly dependent on the volume forecasts adopted by Australia Post.

The legislative framework provides an incentive for Australia Post to under-forecast its volumes. In a building block model, forecast total costs are used to derive a maximum allowable revenue, which is compared with forecast revenue (expected volumes multiplied by proposed prices). If volume forecasts turn out to be overly-optimistic, then Australia Post will not recover its costs.⁴ Further, lower forecast volumes:

- lowers forecast revenue, and can therefore provide support for higher prices.
- provides a greater likelihood of a windfall where actual volumes exceed forecasts. This is because there is also no mechanism by which any cost over-recovery in a prior period (say because forecasts were lower than actual outturn volumes) could result in a penalty applying in the succeeding period.

Therefore, our draft view was that there was a need to rigorously review the forecasts that have been adopted.

2.1.1 Australia post response

Australia Post commented on our draft view as follows:

While this comment was made in the introduction, it suggests a lack of consideration on Frontier's behalf in understanding the current postal environment in general and AP's draft notification in particular. The notion that the framework provides an incentive to under-forecast and over-achieve is a textbook view of regulated firms. It is asserted but not substantiated by Frontier in AP's case.

Based on the PTRM summary in the draft notification (section 13), for proposed revenue to meet the maximum allowable revenue target (or 'required' revenue) volumes would need to increase by more than 10% per annum (and this ignores any impact on costs).

⁴ Assuming that costs are not fully volume variable, in which case costs will also be over-forecast and no under-recovery will occur. Supply of postal services does, however, involve significant fixed costs, so one would expect that under-recovery would occur.

While theoretically any forecast can over or under recover, the reality (and consistent with the outcome of the last quarter of 2008/09 and the first quarter of 2009/10) is that the volume forecasts in the draft notification are more likely to over estimate future volumes rather than under estimate. Not only does the observation ignore the fact that the draft notification stops prices rising to the maximum, but fails to highlight the very real likelihood of an even greater 'under-recovery' from lower than expected volumes.

2.1.2 Frontier response

We accept that Australia Post may, in fact, under-shoot its forecasts in practice. However, while there is a symmetric risk associated with over- or under-shooting forecasts once they have been set, we do not consider that Australia Post's submissions about its incentive to under-forecast are convincing. Such incentive problems are well recognised in regulatory contexts. For example, we note that PostComm, the UK regulator of the Royal Mail, conducted independent analysis of Royal Mail's volumes for use in its 2006-2010 price control, reflecting that in the previous period Royal Mail had adopted overly-pessimistic forecasts.⁵

2.2 Forecasts within the Draft Notification

Forecasts of volumes form a key part of the draft notification and are discussed in some detail in Section 7. This section highlights the following:

- that the volume forecasts used in the draft notification are the same as those included in Australia Post's 2009 corporate plan;
- that the global economic crisis has had an impact on mail volumes;
- in determining mail forecasts, Australia Post considers data⁶ from a range of sources, including:
 - analysis of market conditions
 - input from national and state based sales areas (incorporating knowledge of customer behaviour)

⁵ Postcomm, *Royal Mail Price and Service Quality Review: Final Proposals for Consultation*, December 2005, paragraph 9.24. In its consultation document, Postcomm noted that:

"Postcomm is concerned that Royal Mail has an incentive to provide pessimistic volume projections for major regulatory reviews. Chapter 2 discusses the differences between the volumes forecast by Royal Mail for the last price control and actual outturn volumes in 2003/04. Given the magnitude of the differences between Royal Mail's forecasts for the last price control and actuals, Postcomm will expect it to explain why its previous volume forecasts were incorrect and what changes it has made to its analytical approach to take account of the reasons for the problems."

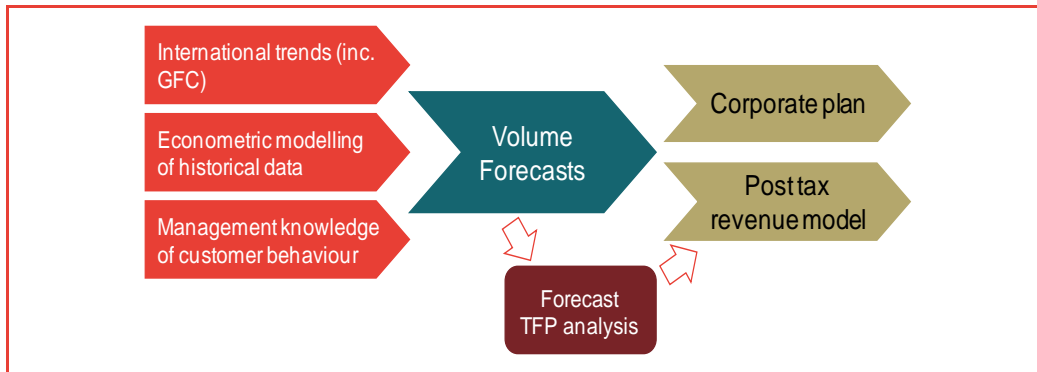
See <http://www.psc.gov.uk/postcomm/live/policy-and-consultations/consultations/price-control/QualityReview.pdf>

⁶ Draft notification, p. 25.

- knowledge derived from econometric modelling of historical data
- there has been a significant decline in mail volume worldwide as well as in Australia.

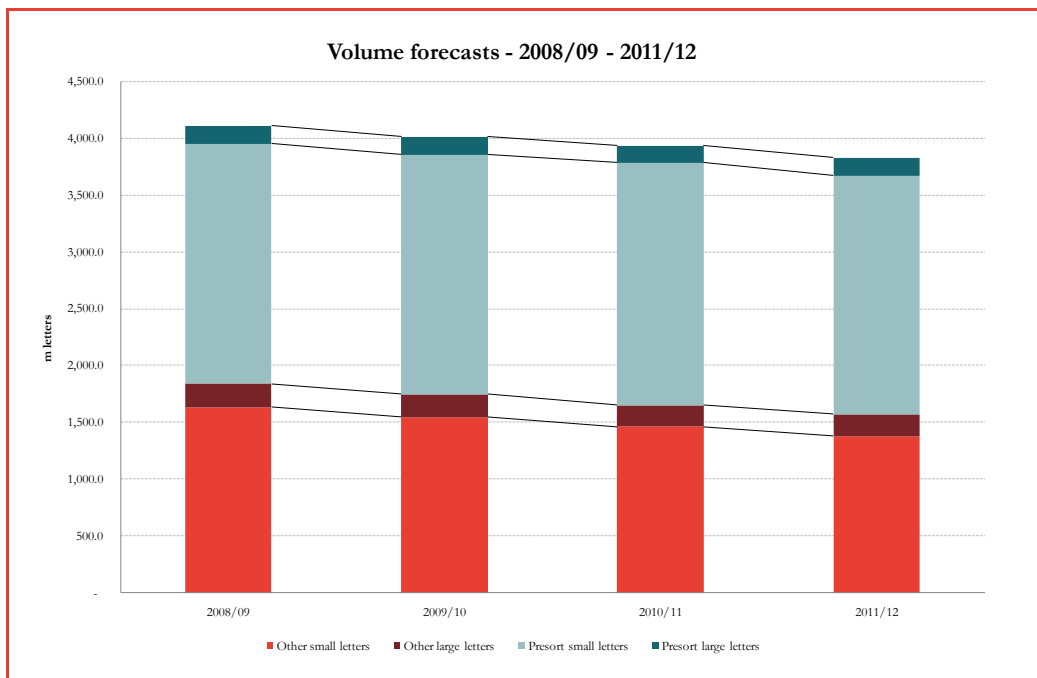
We summarise this information in the following diagram, which maps how forecasts appear to be generated and how they are used.

Figure 1: Summary of process of forecasts



The key forecasts are summarised in Appendix 10 of the draft notification. These are reproduced below. In general terms, the trend is for an overall fall in volumes, which is particularly driven by falls in the volumes of ‘other small letters’.

Figure 2: Volume forecasts in the draft notification



Source: Australia Post, Appendix 10

Table 1: Volume forecasts in the draft notification – reserved services

Letter volumes	PreSort Letters Small	PreSort Letters Large	Other (inc Ordinary) Letters Small	Other (inc Ordinary) Letters Large	Total
2008/09	2,112.3	159.1	1,633.9	207.6	4,113.0
2009/10	2,109.8	159.5	1,550.4	198.5	4,018.1
2010/11	2,131.4	154.0	1,464.5	189.6	3,939.5
2011/12	2,103.9	157.9	1,383.4	187.0	3,832.3
Compound annual growth rate	-0.1%	-0.2%	-5.4%	-3.4%	-2.3%

Source: Australia Post, Appendix 10

We discuss the specific forecasts in the following sections of this report.

Another way in which these forecasts are represented is to break mail types into the following categories:

- transactional
- social
- promotional.

Australia Post breaks the forecasts into these categories because from a business perspective, its view is that the trends in these categories of mail are said to be clearer than the trends in the size categories. Australia Post comments on the trends in Appendix 9 of the Draft notification, noting that:

Transactional volumes are flat to declining and this is attributable to two factors (p. 78):

- the move by all senders to use electronic/digital communication channels, (i.e. substitution), eg
 - from private consumers a reduction in cheque payments by mail, and
 - from business senders an uptake of email, fax streaming, electronic bill presentment, etc.; and
- the move by business senders to look at strategies that consolidate (eg a single bill covering gas & electricity, or a fixed line & mobile phone) or rationalise (eg. moving from monthly to quarterly statements) their mailings.

Compounding this is a slow down in a number of volume drivers, such as take-up of (account based) mobile phones (eg movement to prepaid).

Australia Post is more optimistic about Promotional volumes (p. 78):

...growth has been relatively robust over the past three years (average growth estimated at around 6%), driven by a number of factors including the Mail Marketing initiatives that Australia Post has developed, in the future Australia Post expects promotional growth to average around 2%. This reflects expectations within the broader advertising and marketing industry of more subdued growth in the coming years.

Social mail trends are said to be less positive: (p. 78)

Social mail has been in decline since the 1980's, largely as a result of the continued increase in electronic/digital communication options (eg phone, email, SMS, IM, etc.) and their uptake/utilisation by private consumers.

The relationship between size and type of mail items and the social, transactional and promotional categories are summarised in Figure 1. Transactional mail is the dominant category, by some distance.

Figure 3: Mail forecast by mail category

2009/10	Social m	Transactional m	Promotional m	Total m
PreSort Letters				
Small	-	1,410	700	2,110
Large	-	78	90	168
Total PreSort	-	1,487	790	2,278
Other Letters				
Small	178	1,372	-	1,550
Large	2	213	-	215
Total Other	180	1,585	-	1,765
Total Letters	180	3,073	790	4,043

Note: Includes non-reserved small and large letters over 250g (Draft notification, p. 26)
Source: Australia Post, Letter in response to Frontier Economics questions, 26 August

2.3 General approach to volume forecasting

2.3.1 Views expressed in our draft report

The ACCC concluded in its 2008 review of Australia Post's demand forecasts that:

The ACCC considers that understanding the determinants of demand for postal services is crucial for making reasonable demand forecasts. While it engaged Diversified Specifics to advise it on small letters demand, Australia Post has not systematically used scientific methods in its demand forecasting. Australia Post has based its forecasts primarily on management opinion...⁷

⁷ ACCC, *Australia Post's draft price notification Preliminary view Public version*, June 2008, p. 130.

Australia Post appears to have broadly maintained this methodology in its 2009 Draft price notification. Australia Post supplied some commentary about how it derived its forecasts in the draft notification. This was as follows:

In determining volume forecasts Australia Post considers data from a number of sources, including;

- analysis of market environment conditions;
- input from national and state based sales areas (which incorporates specific knowledge of customer behaviour); and
- knowledge derived from econometric modelling of the association between historical volumes and potential drivers of demand.

Information from these data sources supports the development of volume forecasts that incorporate management assessments and judgements across Australia Post. These forecasts are used as a key input to the determination of corporate and divisional budget targets.

The market environment analysis includes econometric analysis of historical volumes (demand analysis), which is discussed at section 7.3 below. However forecasts are not exclusively based on econometric analysis because of the limitations of such analysis eg the impact of the consolidation, rationalisation and substitution of some mail which is driven by the behaviour of individual senders rather than any general tractable factor or driver.⁸

Australia Post's response to Frontier's information request indicated that forecasts provided to the ACCC were derived via an iterative process between product group managers, sales managers and general management (we discuss this further in the following section).

Our view is that while the factors taken into account by Australia Post are appropriate, its actual approach adopted to deriving and documenting its forecasts is some distance from best practice in a regulatory setting.

Demand forecasts in commercial organisations are often generated using a mix of statistical and management information. We consider that it is reasonable that, in principle, forecasts based on statistical analysis using historical data (such as econometric models) could be improved by the incorporation of information from outside a formal model, for at least three reasons:

- New factors or drivers can emerge that were not present over the period that the model is estimated. These new drivers are anticipated, but cannot be captured in an econometric forecasting model that uses past data.
- Some factors may already be included in the model, but their influence is expected to change significantly in the future. In other words, the elasticities estimated today are not necessarily the elasticities that will hold in the future.

⁸ Draft notification, p. 25.

- Judgement about potential changes in the market may sometimes be required, for example if a large customer is known or is highly likely to change their usage patterns.⁹

However, within the context of a regulatory setting, where there are incentives to under-forecast, there is a burden on Australia Post to ensure that its demand forecasting methodology:

- is well documented, so that it is clear how the forecasts have been derived (at a disaggregated level)
- explains how forecasts are related to historical trends – that is, there should be a recognition that expected divergences from historical trends will require explanation and documentation
- has some means of reconciling the statistical models to its actual forecasts.

As it stands, the forecasts are difficult to assess because they are subjective - that is, the forecasts are not clearly related to objective data such as historical volumes, and there is little documentation as to how, in a quantitative sense, any deviations from trends have been generated. Indeed, while Australia Post uses the results from econometric modelling by Diversified Specifics to support its forecasts, there is no quantitative link between the Diversified Specifics econometric models of letter volumes and the forecasts themselves.

In addition, the use of the forecasts as sales targets injects a degree of uncertainty as to whether the forecasts are unbiased estimates. It may be that individual managers have an incentive to under-forecast so that their recorded performance looks better in comparison, or it may be that managers wish their divisions to be seen to be growing rapidly, meaning that they may over-forecast. We are not aware of any checking that may have been done by Australia Post on the forecasts of both individual managers and group management, but in our view this could be a reasonable way of showing that its forecasts are unbiased.

In our draft report, we noted that these criticisms mean that, in our opinion, we must view the Australia Post forecasts with a degree of scepticism where they show marked divergences from historical trends.

2.3.2 Australia Post response

Australia Post provided a number of comments on our criticisms made above. It noted that:

⁹ See also Frontier Economics, *Volume Modelling For The Price Control: A Report Prepared For Postcomm*, June 2005, p. 22.

- Our views lacked substance and background, including that there was no detail on overseas experience or reference to best practice methodologies applied by other large corporations.
- We should not view forecasts out of line with historical trends with scepticism because that would ignore postal industry realities, with long term trends no longer being valid and suitable for forecasting.
- Overseas trends show that volume declines have set in, began before the GFC hit, and are larger than those in the draft notification.
- We had ignored the fact that the volume, revenue and costs forecasts used in the draft notification were developed for the purposes of AP's corporate plan and that, in that context, it would be naïve to suggest that the forecasts would be biased by the view of an individual sales area as they are also used by other areas in the business to develop cost/resource budgets – progress against which is reported regularly to senior management and the Board.
- “Forecasting on the basis of historic trends has clearly failed”, and that in recent times, postal businesses have had to react pragmatically and use a blend of statistical and other market intelligence where they can, to project volumes in rapidly changing conditions.
- “For this reason understanding the specific customer (and industry) behaviour is critical.”

2.3.3 Frontier response

Australia Post has generally appeared to misunderstand the basis of our comments in this section. To re-iterate, our criticism is not that its forecasts are too low or otherwise inaccurate, or that Australia Post should only forecast on the basis of historical trends. Rather, our comments are directed at the process by which the forecasts are derived. Australia Post's methodology is fundamentally not capable of being validated or critiqued by a third party. The forecasting process is not documented and is therefore essentially a 'black box'. In the context of a regulatory setting where Australia Post has incentives to under-forecast, our view is that this is not a desirable or best practice approach.

Furthermore, while we agree that an understanding of customer and industry behaviour is critical, Australia Post has provided little quantitative information to the ACCC in the draft notification to enable these specific factors to be accounted for in the forecasts.

Our reason for making reference to historical trends is because this at least provides a baseline by which Australia Post's forecasts can be assessed. That is, one can project historical trends and then consider if and why Australia Post's forecasts might be deviating from these trends. The alternative would be to

accept the forecasts uncritically, and again we do not believe this to be an acceptable approach.

As to the criticism that we do not reference overseas experience or best practice regulatory approaches:

- On overseas experience, we would again refer to the UK where the Royal Mail applied a process of econometric forecasts of volumes and then applied ‘overlays’ to these forecasts to reflect information that could not be effectively captured in these models. This process allows for a quantitative and transparent examination of the deviations from historical trends, allows for sensitivity analysis (e.g. for different growth rates or changes in rates of substitution) and is therefore a superior approach to that adopted by Australia Post in its notification.
- On best practice forecasting approaches, we believe that the approaches that are adopted in other regulatory contexts do provide for a more detailed and rigorous analysis of forecasts. For example, the recent decision of the Australian Energy Regulator (April 2009) on the NSW Electricity Distribution network businesses (and associated documents) contains an extensive discussion of forecasting methods for volumes, with forecasting models being used that allow for an explicit review of key volume drivers.¹⁰

¹⁰ See <http://www.aer.gov.au/content/index.phtml/itemId/720331> for details of this review.

3 Analysis of small letter demand forecasts

In this section, we consider the approaches taken by Australia Post to forecast the demand for the small pre-sort and small ‘other’ letter categories, which together comprise about 90 per cent of the reserved letter volumes and 75 per cent of the total letter volumes.

We first present historical and projected trends for small letter volumes and factors postulated to be the key volume drivers. Next, we describe and comment on Australia Post’s and Diversified Specifics’ modelling approaches and then assess Australia Post’s forecasts against a set of benchmarks based on historical trends. We conclude the section with some recommendations on how Australia Post could improve its forecasting methodology.

3.1 Information supplied by Australia Post

In Section 7 of the draft notification, Australia Post presented an overview of high level trends affecting small letter demand. In particular, it is noted that the traditional association between growth in non-farm GDP and small letter volumes has broken down (from around 2000/01) and that volumes were effectively plateauing. It is stated that mail consolidation and the increase in electronic substitution have become the main drivers of small letter volumes, outweighing any positive GDP impact.

Appendix 9 of the draft notification summarises some further information regarding the trends associated with transactional, social and promotional mail as these relate to small letters:

- transactional volumes (important to both kinds of small letters) are flat to declining, and this is attributable to two factors:
 - substitution towards electronic/digital channels
 - consolidation of mail towards single bills or less frequent bills
- promotional volumes (important to pre-sort) have been robust but growth has slowed as a result of reduced advertising and marketing activity
- social mail (important to other small letters) is in decline due to substitution towards electronic means of communication.¹¹

Australia Post also supplied us with a number of Diversified Specifics’ reports which Australia Post indicated were used in: “isolating trends, establishing

¹¹ See Appendix 9, Draft notification, p. 78.

demand drivers, estimating statistically significant market based demand elasticities and developing forecasting models”.¹² These reports included:

- Domestic Small Letter Segment Volume Demand Addendum, 1996-2008.
- The Impact of Economic Downturns on Income Elasticity of Demand: PreSort Barcoded Small Letters.

The first of these reports suggests a deteriorating landscape for small letters in the short run.¹³ Other small letter volumes are said to be declining at an increasing rate, from substitution pressures, while small pre-sort letter volumes are suffering from the economic downturn.

The second report is a study devoted to better understanding whether the relationship between GDP growth (‘income’) and pre-sort letter volumes is asymmetric between periods of low and high growth. The study finds support for the hypothesis that the elasticity of volumes with respect to changes in GDP is lower during periods of high growth.¹⁴

In addition to the above reports, Australia Post and Diversified Specifics provided clarifications (both in person and in writing) to a number of issues raised by the ACCC and Frontier concerning their modelling approaches. Further, Diversified Specifics undertook additional modelling in September 2009 after Frontier questioned whether Diversified Specifics had followed standard procedures for handling time series data. Frontier took into consideration all the materials received when preparing the draft report.

3.2 Australia Post’s and Diversified Specifics’ comments on the draft report

Australia Post and Diversified Specifics were given the opportunity to review and comment on Frontier’s draft report. Frontier has given consideration to the extensive comments from both parties, and the additional modelling results received from Diversified Specifics. Where we found that the comments had sufficiently addressed our concerns or clarified aspects of Australia Post’s and Diversified Specifics’ modelling approaches, we have removed them from the final report.

In addition to addressing our concerns regarding their modelling approach, both Australia Post and Diversified Specifics raised concerns with Frontier’s use of the exponential smoothing technique. It is referred to by both parties as Frontier’s

¹² Draft notification, p. 28.

¹³ *Domestic Small Letter Segment Volume Demand Addendum*, pp. v and 7.

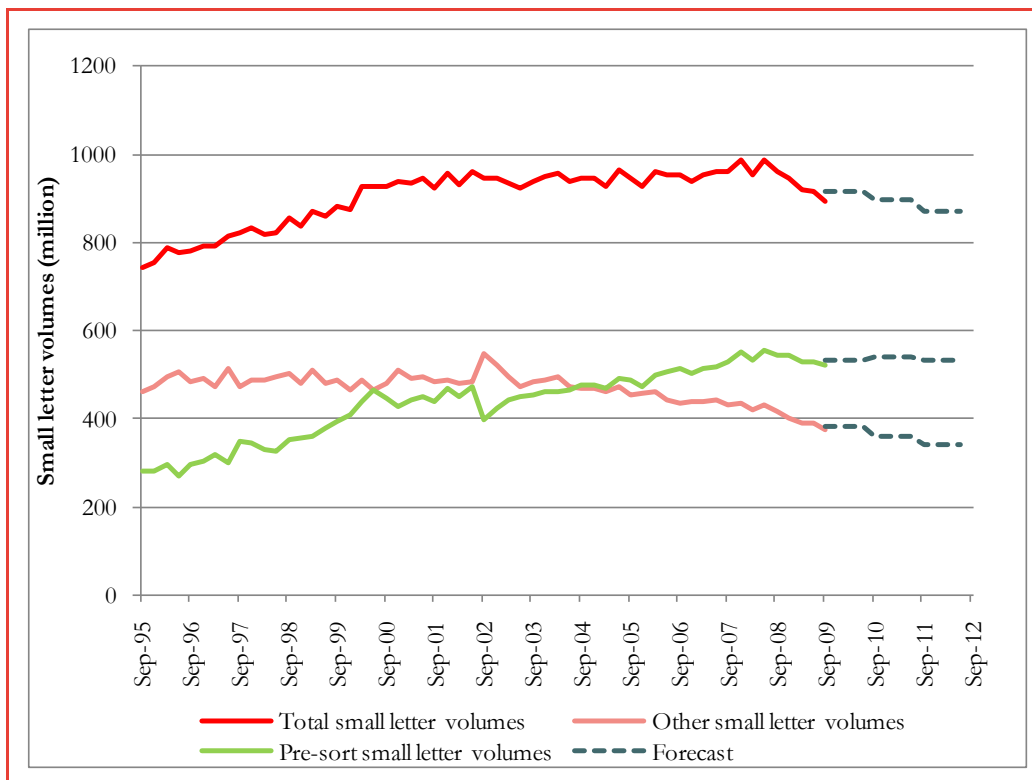
¹⁴ Draft notification, p. 29.

“own choice of forecasting method”. This misunderstands what we have done and how we have used the results arising from the exponential smoothing analysis. As discussed in the previous section, we consider that the forecasts of Australia Post must be assessed against historical trends, because this provides the only reasonable objective basis for assessing the forecasts given the information and time available. Within that context, we considered a number of projections based on historical trends, including exponential smoothing as well as more simple trends. Australia Post’s forecasts are then considered in terms of how they align with the projections from the benchmark trends. We discuss this further in section 3.7.

3.3 Trends in historical and projected volumes

Figure 4 presents seasonally adjusted quarterly volumes for total small letters and its two segments, other and pre-sort letters. Pre-sort letter volumes have grown steadily since 1995, with a one-off downward adjustment in volumes occurring in September 2002, around the time of the closure of unbarcoded pre-sort services. Almost a mirror image of the shift occurred in other small letter volumes indicating a substitution from pre-sort to other letters as a result of the closure. Another noticeable change in other small letter volumes that occurred around 2002 is a change in trend from relatively constant volumes to a gradual decline.

Figure 4: Historical and projected trends in small letter volumes (quarterly data)



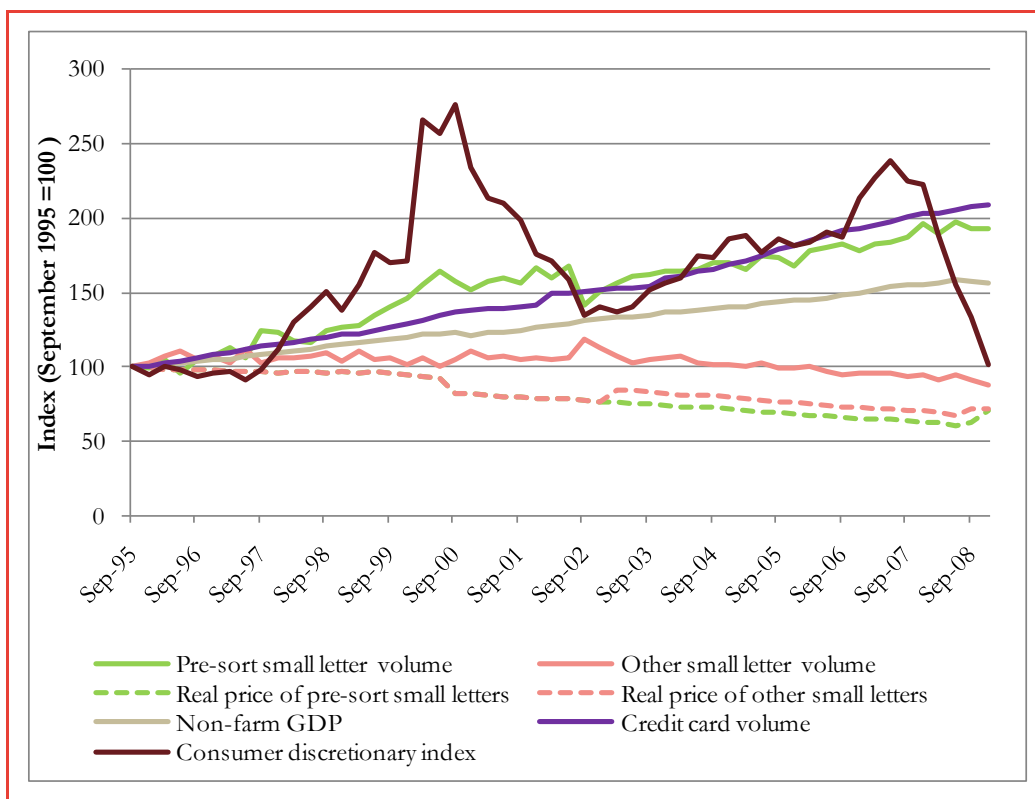
Notes: (1) Historical volume data are seasonally adjusted. (2) Australia Post’s demand forecasts are made on an annual basis. For the purpose of this figure, quarterly volumes have been obtained by dividing the

annual forecasted demand by four. (3) For the third quarter 2009 we present both the forecasted and the actual volumes.

Source: Diversified Specifics, Australia Post

Figure 5 graphically presents trends in some of the variables postulated to drive small letter volumes. Non-farm GDP and credit card volumes,¹⁵ which Australia Post and Diversified Specifics use as a proxy for behavioural changes toward electronic means, both exhibited a steady upward trend.

Figure 5: Historical trends in factors hypothesised to influence small letter volumes



Notes: (1) Volume and GDP indices based on seasonally adjusted data. (2) Indices based on quarterly data.

Source: Diversified Specifics

During the examined period, two stages in the real price of pre-sort and other small letters are apparent: a period of relatively constant real prices lasting until mid 2000, followed by a period of declining real prices. In addition to the change in slope in 2000, both price trends exhibited a downward shift in that year (i.e. a one-off adjustment in price), with only the real price of other small letters readjusting upwards in early 2003. The consumer discretionary index, which Australia Post and Diversified Specifics use as a proxy for the health of the

¹⁵ We have been informed by Australia Post that this variable represents the number of credit cards issued.

advertising industry, exhibited most volatility (relative to other drivers) over the examined period.

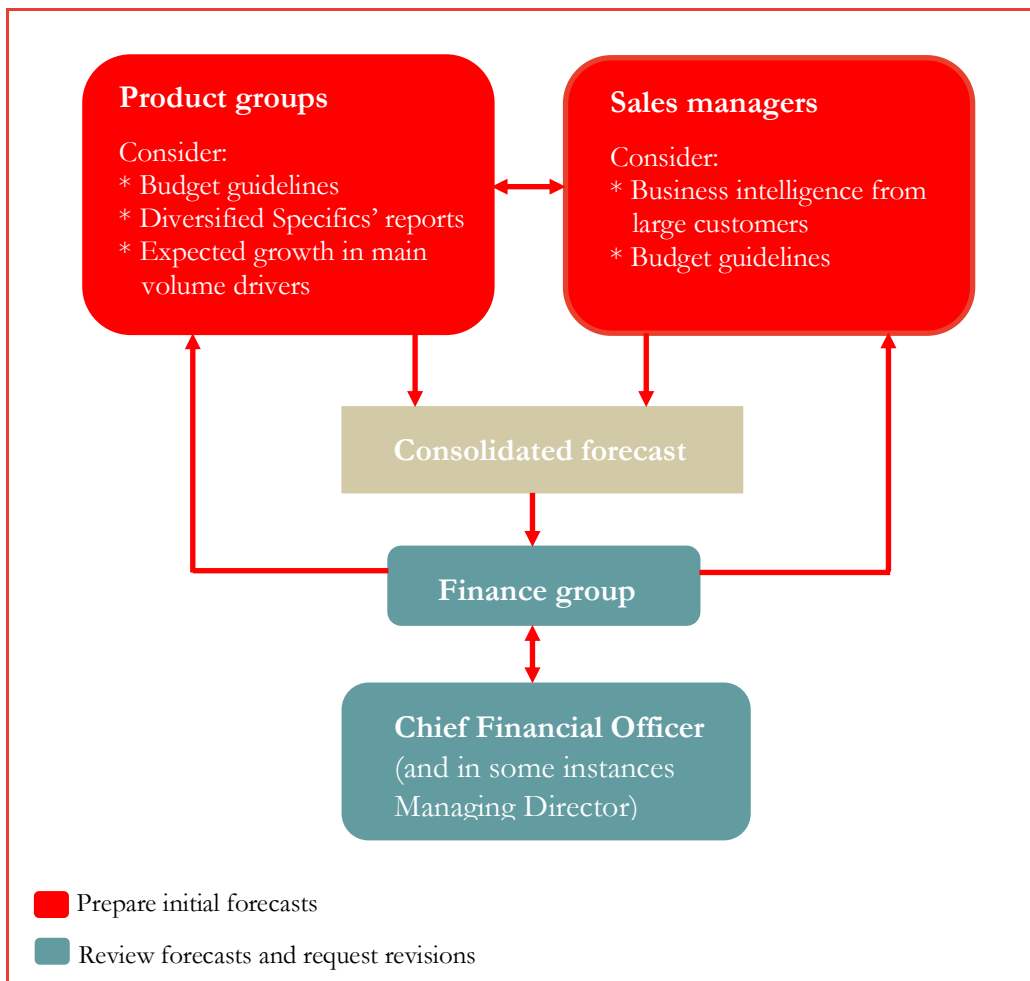
Noting the changes in trends, both in terms of upward and downward shifts and changes in slope, is important in producing a forecasting model. It informs the modelling process (i.e. selection of variables such as shift dummies for intercept and slope coefficients to capture the changes over time) and provides guidance in selecting justifiable time periods for testing the structural stability of the model.

3.4 Australia Post's forecasting methodology

3.4.1 Overview¹⁶

Australia Post employed a bottom up approach in producing the volume and revenue forecasts presented in the draft notification. Figure 6 is a graphical representation of this process (as Frontier understands it).

Figure 6: Australia Post's approach to forecasting letter volumes



Source: Communication with Australia Post

In the first stage of the process, which commenced in December 2008 following the release of the budget guidelines, each product group and sales area prepared an initial forecast. Product groups' forecasts were done by product line, with each

¹⁶ Unless otherwise noted, this section is based on in-person communication with Australia Post (working session on 3 September 2009 organised by the ACCC) and Australia Post's responses to Frontier Economics' questions (submitted 26 August 2009).

product line consisting of either reserved or unreserved letters (but not both).¹⁷ Product groups and sales managers were provided the budget guidelines, which included guidance about the product price increases.¹⁸ In addition to the budget guidelines, Diversified Specifics' reports were made available to the product groups, which used them to supplement their own knowledge/analyses. Specifically, the results and information from the reports were used to gain understanding of the historical drivers of letter volumes, but were not used to derive the actual forecasts. When preparing the initial forecasts, sales managers primarily relied on specific knowledge about customer behaviour for different products. Such business intelligence, for example, may have included information on whether a telecommunications firm intends to consolidate fixed line and mobile accounts into a single bill, which would have a negative effect on letter volumes during the current price notification period. Once both the product groups and sales managers had completed their initial forecasts, these preliminary forecasts were consolidated and passed on for review, first to the finance group and then to the Chief Financial Officer. The initial forecasts went through several rounds of revisions, involving dialogue between the product groups, sales groups, finance and senior executive staff. Due to the iterative nature of this process, where points of clarification might have been addressed through informal meetings or phone calls, there are no consolidated internal documents within Australia Post that explain how the agreed mail volume estimates have been arrived at.

3.4.2 Critique

As indicated in Section 2, our main criticism of Australia Post's forecasting methodology is that it is non-analytical and not transparent. In simple terms, the analytical heart of any forecasting model comprises sets of inputs (data and assumptions), and the relationships imposed on those input elements which determine how the forecasts for the outputs are calculated. To evaluate a model or a modelling approach, a reviewer would need to assess the validity of each of these elements. This evaluation approach, however, cannot be applied to Australia Post's methodology as the data inputs, the assumptions and the calculations that went into producing the forecasts are not documented.

While it is a reasonable approach to apply some adjustments based on business intelligence to forecasts derived through an econometric analysis (to better reflect business and economic conditions that could not have been captured easily by the model), Australia Post seems to have not relied on any formal modelling. The only formal modelling done by or on behalf of Australia Post (that we have been

¹⁷ There is only one product line that contains both reserved and unreserved mail.

¹⁸ The budget guidelines identified the precise price increases that are proposed by Australia Post in its 2009 price notification, and indicated, at a high level, possible price increases beyond January 2010.

made aware of) is that performed by Diversified Specifics. However, as we have been informed, “forecasting was never a stated objective of the research” undertaken by Diversified Specifics.¹⁹

At a minimum, best practice in modelling would require that all key assumptions (i.e. those assumptions that the modelling results are most sensitive to) be documented, along with the basis for making them. This would enable an independent party to assess: (a) whether the assumptions used are valid (i.e. the basis on which they were made is reasonable); (b) whether the assumptions were used consistently across different product groups and sales areas; and (c) if they were not, whether the departures are justified.²⁰

Another departure from best practice is the lack of flexibility in Australia Post’s model; in particular, the inability to conduct any type of sensitivity analysis in a transparent manner. The importance of conducting sensitivity analyses is apparent in the current economic environment where the projections of one of the drivers of letter volumes, GDP, have been revised significantly over the past year.

3.4.3 Consideration of the effect of the proposed price increases on volumes

The ACCC asked Frontier to assess whether Australia Post had taken sufficient account of its proposed price changes on its volume forecasts. We asked Australia Post how it has taken demand elasticity (that is, the expected change in demand for a given change in price) into account in generating its forecasts. It responded as follows:

“Historically letter products are considered (based on a number of studies) to be price inelastic (although the level of elasticity will vary across different letter segments). As a result we have not incorporated price elasticity into the volume forecasts. However, price elasticity is something that Australia Post is monitoring to understand any change in the historical trend – we believe that the level of elasticity may increase in the future given the additional choices that are available for different letter types.”²¹

We agree with Australia Post that historical own-price elasticities for many kinds of letters have been in the inelastic range (and Australia Post re-affirmed this in

¹⁹ Chris Paterson, of Diversified Specifics, comments on the File Note prepared by the ACCC summarising the meeting held on 16 September 2009.

²⁰ Setting out explicitly the assumptions and calculations that underpin a set of forecasts would also facilitate replication of the forecasts, a fundamental requirement of any credible forecasting methodology. Given the apparent lack of documentation, it is not obvious that Australia Post would be able to replicate its forecasts if it went through the same exercise again.

²¹ Australia Post’s responses to Frontier Economics’ questions (submitted 26 August 2009).

its response to our draft report). In his 2006 review of elasticity studies for postal products, Robinson finds that:

“In general, postal products are relatively price inelastic. The range between lowest and highest estimated elasticities has remained relatively small and constant over the years. All but one estimate of the price elasticity of mail products are less than -1, meaning that a 10% change in postal prices will produce less than a 10% change in postal volumes. Price elasticity measures for postal products range between -0.2 and -0.8.”²²

Nonetheless, the finding of inelastic demand does not imply no demand response. Further, the recent trends for small letter types are said by Australia Post to point towards “a deteriorating landscape”²³. One of the two factors accounting for this is an increase in “substitutive pressures”, particularly for other small letters. An increase in substitutive pressures is really another way of saying that the own-price elasticity of letters has become and is likely becoming more elastic. Further, Diversified Specifics model for other small letters indicates that “[a] 5% increase in the real price of sending Other Small Letters was associated with a 3.2% decrease in Other Small Letter volumes”²⁴ implying an own-price elasticity of -0.65.

Based on the information received from Australia Post, it is difficult to assess to what extent the effect of the proposed price increase has been taken into consideration when projecting letter volumes. As described in its response above, Australia Post suggested that it did not take into consideration the proposed price increase; however, it also stated that it did provide the budget guidelines (containing the information on the proposed price increase) to product groups and sales managers prior to the commencement of the forecasting process. Hence, it is possible that at least some managers may have taken into consideration the effect of the proposed price increase on the future volumes when preparing the initial volume forecasts.

If the effect of the proposed price increase was not taken into consideration, then it makes the forecasts subject to some doubt. We consider that the potential elasticity effects are simply too large to be ignored. Note that, for example, if elasticity was not considered by managers in their initial forecasting, using the Diversified Specifics elasticity for small other letters would imply that the proposed 9.1 per cent increase in the basic postal rate might decrease volumes by nearly 6 per cent in the long run.²⁵ We return to this issue in Section 6.

²² Robinson (2004). No study reviewed by Robinson examined the period beyond 2004.

²³ Draft notification, p. 28.

²⁴ March 2009 report, p. v.

²⁵ Even though some of this elasticity effect is offset by inflation (forecast at 8 per cent over the three-year forecast period), we also understand that Australia Post’s forecasts have been prepared with additional price increases in mind (see p. 13 of the Draft notification).

If the proposed price increase was taken into account systematically, it would have been preferable if Australia Post generated a set of ‘baseline’ forecasts, and had then documented how its proposed price changes had influenced forecasts.

3.5 Types of demand forecasting models

As we noted above, Australia Post did not rely on formal econometric techniques to derive its forecasts. However, it did use the commissioned studies into mail demand trends to inform its forecasting. In this section we provide an overview of demand forecasting models which have been used for the purpose of forecasting mail volumes.

Demand forecasting techniques generally fall into one of two very broad categories (note these are general economic forecasting methods, i.e. they do not pertain solely to forecasting mail demand):

1. Structural approaches based on quantifying the influence of one or more independent variables on a dependent variable (the series of interest).
2. Time series approaches based on characterising the behaviour of the series of interest in term of trends, and seasonal and cyclical factors.

Structural models of mail demand

This largely econometric approach seeks to establish a relationship between mail demand and other variables that are known (or hypothesised to be) key drivers of demand for mail demand. These can include economic variables (such as GDP), socio-demographic variables (in particular, population levels and delivery points). As Harding (2004, p. 3) describes it: “Implicit in these models are a series of insights from economic theory that suggest that demand is indeed a function of price, income, and other such economic variables (rather than behavioural variables).” Once these relationships have been determined (using standard statistical methods, such as regression) demand can then be forecast, conditional on medium to long-term projections of each of the explanatory variables.

The major advantage of this approach is that important insights are obtained into what is driving demand for mail, and we can answer counterfactual questions regarding the impact of a change in one of the dependent variables on the quantity of letters. For example, the coefficient on price in a regression on demand tells us by how much the quantity demanded of mail products changes when the price of postage increases by 1 per cent. However, when models of this type are used for forecasting, the forecaster has to either make assumptions about the future values of the driver variables in the model (resulting in conditional forecasts), or develop forecasting models for each of the explanatory variables in the mail demand model (which is data-intensive process). Further, modellers may fail to recognise or not have enough data points to properly

account for a structural change in data series, which will compromise forecast results.

Time series models of mail demand

Time series methods do not try to identify the key drivers of demand and how they influence mail volumes. Instead, they try to identify trends and dynamics in historical values of the series being forecast to, through sophisticated extrapolation methods, project the volumes into the future. These methods are based on the premise that history provides reasonable guidance as to the expected values of future demand. Diagnostic and testing procedures are available to identify technique that provides the best fit to the historical data and the most reliable forecasts.

Forecasts based on time series analyses are relatively easy to obtain because they require only a historical sample of volume data and are less informationally demanding than structural models. Even more importantly, they allow for any structural change to be reflected quickly in the forecasts by allowing more recent past values to have a greater impact on the forecasts relative to earlier values. However, under this approach the key drivers of demand are not identified, limiting its usefulness in understanding ‘what is going on’ in mail demand.

Hybrids

The delineation between the structural and statistical approaches is not always clear-cut. Some forecasting models (as discussed below, these include those used in much of the postal literature) are hybrids of these above approaches. That is, they model both structural determinants of demand as well as incorporating time series dynamics.

International approaches to forecasting mail demand

In the course of reviewing the materials supplied by Australia Post, we conducted a brief review of the relevant literature on mail demand.

A useful introduction to this literature is Harding (2004). He categorises studies of mail demand by type, of which the most relevant for our present purposes are structural models built using time series data (as this is the approach of Diversified Specifics to modelling mail demand). Key studies cited include Nankervis and Rodriguez (1995), Pimenta and Ferreira (1999), Nankervis et al (2002) and Florens et al (2002).

Each of these recent international studies indicates that estimating some form of an error correction model is the preferred approach to forecasting mail demand.²⁶

²⁶ The reason why this model is preferred from an econometric perspective is discussed further in Section 3.6.2.

An error correction model is a hybrid model that incorporates both structural variables of interest (e.g. GDP) and dynamic variables (e.g. lags of GDP).

More recent studies we have examined, for example by Cazals et al (2007) and Soteri et al (2009), continue with this same basic error correction model formulation approach to modelling different questions of interest (such as modelling of forecast uncertainty, and the influence of the internet on mail demand, respectively).

3.6 Diversified Specifics' analysis

3.6.1 Overview of Diversified Specifics' modelling approach

Diversified Specifics was not asked by Australia Post to prepare a model of mail demand for the purposes of forecasting. Instead, Diversified Specifics work is primarily useful as a tool in understanding historical drivers in mail demand and changes in these drivers.

To gain an understanding of the demand for the small pre-sorted letters and other letters, Diversified Specifics estimated a number of log-linear (or log-log) demand models for each letter segment with the explanatory variables chosen to reflect economic activity, price, behavioural and product changes, and a number of exogenous events (e.g. elections). All continuous variables, including the dependent variable, were specified in logarithmic form so that the estimated coefficients represent the elasticity of letter volume with respect to a given explanatory variable. We understand Diversified Specifics chose the preferred econometric model for each letter segment based on diagnostic tests and common sense checks. The key demand drivers and elasticities from the preferred models are presented in Table 2.

Table 2: Diversified Specifics estimated elasticities – Small letters

Explanatory variables	Pre-sort letters	Other letters
Non-farm GDP ¹	0.99	NA
Advertising industry health measure ²	0.12	NA
Barcode introduction ³	0.10	NA
Credit card volume ¹	NA	-0.91
Real price of other small letters	NA	-0.65
Closure of unbarcoded pre-sort service ⁴	NA	0.11

*Notes: (1) Seasonally adjusted; (2) S&P/ASX 200 Consumer Discretionary Index used as a proxy variable; (3) Binary variable equal to zero before October 1999 and to one afterwards (4) Binary variable equal to zero before September 2002 and to one afterwards; NA – not included in the preferred model.
Source: Diversified Specifics*

In its 2009 report, Diversified Specifics does not explicitly state whether its models provide long run or short run elasticities. If Diversified Specifics has used the correct cointegrating relationships in its regression equations, then one could consider the estimated coefficients to represent the long run elasticities.

3.6.2 Critique of Diversified Specifics' modelling approach

Variables selection

The variables considered by Diversified Specifics for the inclusion in the demand models for pre-sorted and ordinary letters are consistent with the literature on mail demand. Harding (2004), for example, states that most studies on mail demand model the quantity of mail demanded as a function of economic activity indicators, mail characteristics, household demographics and relevant substitutes for mail. These categories are broadly consistent with the thematic grouping of variables used by Diversified Specifics.

Diversified Specifics notes that the credit card volumes variable is included in the other small letter volumes model to capture the trend in substitution from paper letters to electronic means. Including additional variables, such as cheque volumes, was rejected due to high collinearity with the credit card volumes. In the draft report, Frontier raised a concern that credit card volumes may be capturing only one facet of the apparent behavioural changes, and posed the question whether a more appropriate way of modelling the substitution effect would be to include some new technology variables for example, number of internet connections. In its response to Frontier's draft report, Diversified Specifics informed us that it has investigated this issue in the past and that it did not include internet connections in its preferred models for the following reasons: (1) unlike credit card volumes, internet connections would not account for bill payments made by phone; and (2) "obtaining a suitable data series that robustly measures the number of Australian internet connections, has proved to be a difficult task".

Time series data and functional form

In the reports submitted to the ACCC, Diversified Specifics did not provide any information on whether it tested for stationarity and cointegrating relations in the variables included in its preferred models.²⁷ At a working session on 3 September

²⁷ The importance of performing unit root and cointegration tests is explained in Annex A.

2009, Frontier asked a number of questions about the time series properties of the data used by Diversified Specifics, specifically whether the unit root tests were performed. After the meeting Diversified Specifics provided information to Frontier outlining the stationarity testing that it had performed in relation to small letter volumes.

In this analysis, Diversified Specifics presented the results of the unit root tests performed on all continuous variables included in the preferred demand models for small letter volumes. The results are similar to those presented by Frontier in Appendix. Specifically, the results show that all continuous variables, including the dependant variables, are integrated of order 1 (i.e. they are non-stationary in levels but can be made stationary by taking first differences). Using what is known as the Johansen test, Diversified Specifics then went on to test whether these variables were co-integrated, i.e. whether there exists a long run relationship between them. If such a relationship is shown to exist, then the long run elasticities of letter volumes could be estimated with the ordinary least squares (OLS) procedure using the log-log model such as the one specified by Diversified Specifics. Diversified Specifics showed that the variables were cointegrated and that the elasticity estimates from the cointegrating equations were similar in magnitude and statistical significance to the results presented in its March 2009 report.

Modelling period

The letter volumes models were estimated using quarterly data, with the modelling period for pre-sort small letters spanning from September 1995 through December 2008, while the modelling period for other small letters was truncated to December 1999 - December 2008 period. Diversified Specifics does not provide a clear justification for truncating the modelling period for other small letters, either in their March 2009 report or in the December 2007 report. The beginning of the modelling period for other small letters does coincide with the introduction of barcoding technology, the event that Diversified Specifics “hypothesised to be negatively associated with [o]ther small letter volumes”.²⁸ It is not explicitly stated in the reports that this event was the reason for truncating the series. Whatever the reason, our view is that it is better to formally test for structural breaks in the series, using methods such as the Chow test. Moreover, an occurrence of an event or behavioural change does not imply that one has to ignore earlier data. One can (and should) attempt to model the change, instead of ignoring a large amount of the data.

²⁸ Diversified Specifics, December 2007 Report, p. 43.

Testing for robustness

Diversified Specifics tested the robustness of their models by excluding one quarter at a time from the data and then re-estimating the models.²⁹ This is not a standard way of testing for robustness, plus the method is not very insightful or statistically powerful. More appropriate ways to investigate the structural stability of a model include formal Chow tests and plots of CUSUM and CUSUMSQ charts to identify statistically significant structural breaks.³⁰

Conclusion

Diversified Specifics, over the past decade, has developed structural models that estimate relationships between mail volumes and potential demand drivers. These models have not been designed as forecasting models. Our review suggests that Diversified Specifics work has some value as a tool in understanding past trends, notwithstanding some methodological concerns. However, ultimately this work was of limited value in reviewing Australia Post's forecasts because Australia Post did not rely on Diversified Specifics' analysis in a systematic way.

3.7 Assessment of Australia Post's forecasts for pre-sort and other small letter volumes

In the previous section, we noted that Australia Post's forecasts should be viewed with a degree of scepticism where they show marked divergences from historical trends. To assess whether and to what extent Australia Post's forecasts diverge from historical trends, we compared them to a set of benchmarks derived from past volume data. The benchmarks used are a trend line (chosen based on the 'goodness-of-fit' criterion) and values derived through exponential smoothing.

When fitting a trend line, all past volume data points are given equal weights. If we believe that more recent past is a better predictor of the future, then the exponential smoothing method provides more reliable indication of future trends than a simple trend line extrapolation method.³¹

²⁹ Commenting on Frontier's draft report, Diversified Specifics notes that "the ultimate check on robustness of the model . . . is the commonsense test whereby the outcomes of the models do indeed agree with Australia Post management understanding of the way volumes fluctuate".

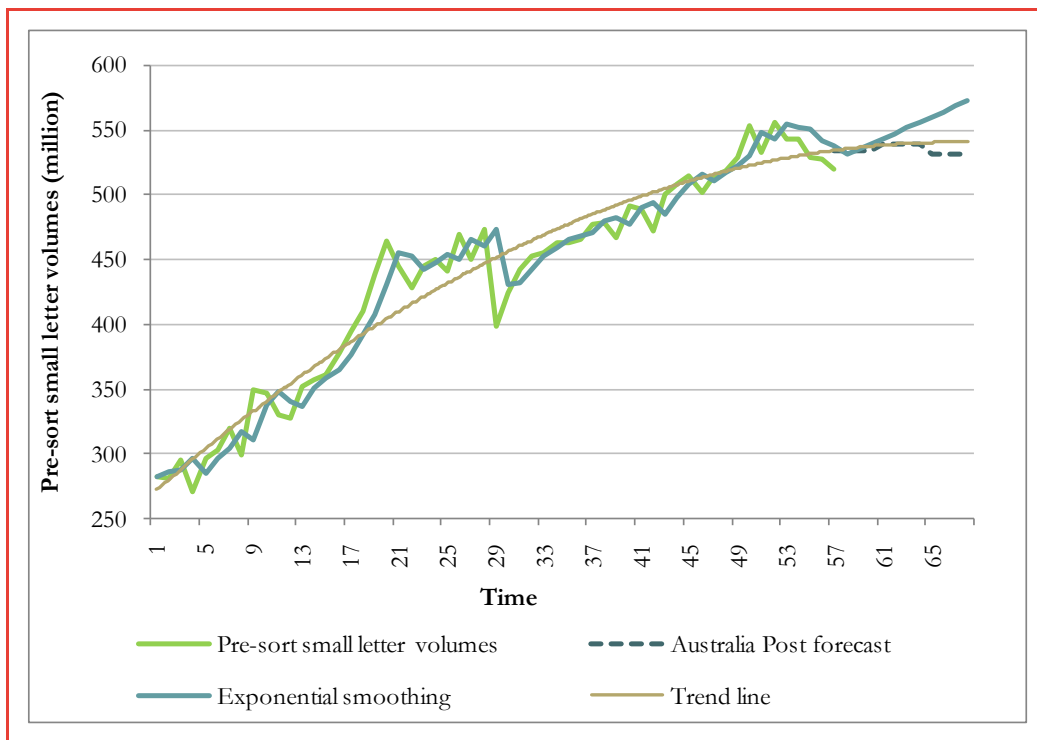
³⁰ The CUSUM (cumulative sum of the residuals) and CUSUMSQ (CUSUM of squares) tests are based on the one step ahead prediction error, i.e. the difference between y_t (the dependant variable at time t) and its predicted value calculated using the parameters from the regression estimated with the first $t-1$ observations. A plot of CUSUM or CUSUMSQ showing the residuals persistently straying outside the error bounds would suggest model instability. The tests are particularly useful when one is uncertain about when a structural change might have taken place (see Green 2003, Chapter 7).

³¹ Exponential smoothing calculates forecasts as a weighted average of past values, with the weights declining geometrically. Exponential smoothing was done using EViews (v5), a statistical package,

The benchmarks are not intended to provide forecasts of mail volumes over the price notification period. Rather, they are intended as a guide to assess how Australia Post's forecasts compare to trends in the data.

After the submission of Frontier's draft report, the ACCC and Australia Post informed us that the classification of ordinary and pre-sort letters was not consistent between the data used by Diversified Specifics (and provided to Frontier) and the data used by Australia Post in its price notification. Consequently, Australia Post has provided us with its revised forecasts. This has affected the analysis in this section as well as in Section 5.

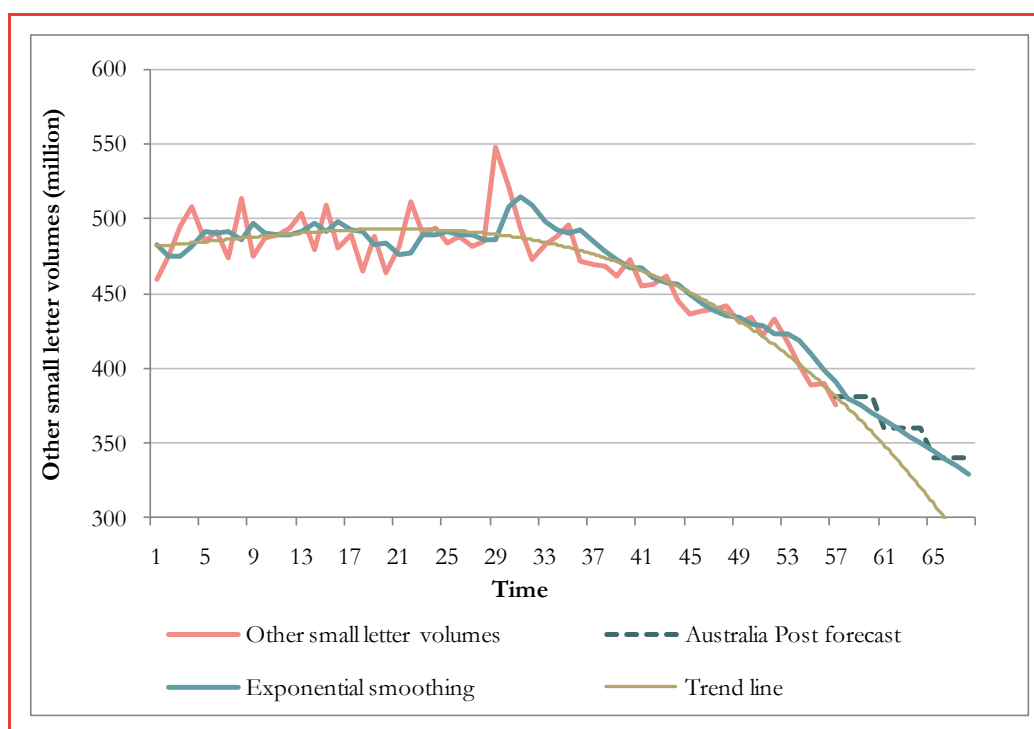
Figure 7: Pre-sort small letter volumes – forecast vs historical trends (quarterly data)



Notes: (1) Historical volume data are seasonally adjusted. (2) The Holt-Winters exponential smoothing method (which adjusts for the trend in the data series) was used. (3) 2nd order polynomial trend line was fitted. 2nd and 3rd order polynomial trend lines provided similar goodness-of-fit, with the former resulting in more conservative (i.e. lower estimates). (4) For the third quarter 2009 we present both the forecasted and the actual volumes. (5) On the horizontal axis: 1 = 3rd quarter in 1995, 5 = 3rd quarter in 1996, etc.
Source: Diversified Specifics, Australia Post, Frontier Economics

with the smoothing method and the smoothing parameters selected by minimising the sum of squared errors over the modelling period 1995 to 2009.

Figure 8: Other small letter volumes – forecast vs historical trends (quarterly data)



Notes: (1) Historical volume data are seasonally adjusted. (2) The Double exponential smoothing method (which adjusts for the trend in the data series) was used. (3) 3rd order polynomial trend line was fitted. (4) For the third quarter 2009 we present both the forecasted and the actual volumes. (5) On the horizontal axis: 1 = 3rd quarter in 1995, 5 = 3rd quarter in 1996, etc.

Source: Diversified Specifics, Australia Post, Frontier Economics

The results for each letter type are as follows:

- For pre-sort small letter volumes (Figure 7), Australia Post's forecasts are below both of the benchmark forecasts for the entire price notification period, except for one or two quarters.³²
- For other small letter volumes (Figure 8), Australia Post's forecasts are above the polynomial trend line, but tracks the exponential smoothing forecasts.³³

Australia Post's forecasts of pre-sort small letter volumes are, on average, about three per cent lower than the exponential smoothing benchmark volumes. Considering that around 6-8 percentage points of GDP growth are expected over

³² To assess how sensitive the results are to the selection of the modelling period, we re-forecasted the volume trends using 2000/01 as the starting year (the same starting point used by the ACCC in its 2008 Decision Report on Australia Post Price notification (p. 87). Shortening the modelling period (and using the Holt-Winters method) produced forecasts that were, on average, 3 per cent lower over the price notification period than the estimates derived using the 1995-2009 volume data. These estimates, on average, matched Australia Post's forecasts. This sensitivity analysis indicates that forecasts are sensitive to the modelling period chosen. Determining the appropriate modelling period is beyond the purview of this report.

³³ Shortening the modelling period (and using the Double exponential smoothing method) had almost no effect on the projected volumes over the price notification period. .

the next three years,³⁴ we asked Australia Post about its pre-sort forecast, to which it replied:

The 2010/11 forecast assumes a more favourable economic environment (both GDP and advertising industry), however, it also assumes the likelihood of a Federal election (Jun to Dec 2010) which is forecast to have a positive impact upon demand for PreSort Small Letters. This is based upon the behaviour (or change in) of political parties in 2007 where there was a deliberate move (in part as a result of our Mail Marketing people demonstrating/discussing the effectiveness of addressed mail) to move from the use of unaddressed mail to addressed mail. While we believe some of this 'one off' activity will be covered by promotional mail growth in 2011/12, it will not be enough to offset an expected reduction in transactional mail.

No further quantification of the expected significance of these factors was provided. We further examine how the deviation from trend in small letters affects expected revenues in Section 5.

3.8 Conclusions – small letters

Australia Post's forecasting methodology for small pre-sort and other small letter volumes is not amenable to a rigorous review for its suitability for use in a building-block model. That is because its forecasts are not developed in an objective way and are likely to be influenced by strategic considerations. Further, its methodology does not document assumptions or subject the forecasts to the over-arching discipline of an econometric model (which would allow sensitivity testing of the forecasts).

As Australia Post's forecasting approach is not amenable to quantitative review, we have analysed its forecasts primarily in comparison to historical trends. The key area of concern is related to pre-sort volumes, which are forecast to be relatively flat even though there is an expectation that GDP growth will remain reasonably robust throughout the forecast period. Other small letter volumes are forecast to decline, but this appears more consistent with the recent trend.

We further conclude that for future price notifications, it would be desirable for Australia Post to undertake a more robust approach to forecasting mail demand. Such an approach could have two stages. The first stage would be to estimate an econometric forecasting model, taking account of:

- time series data issues, such as stationarity and correct specification of the cointegrating vector of explanatory variables
- structural breaks in the data (i.e. perform formal tests for structural breaks which would then guide model specification)

³⁴ Australia Post assume growth rates in GDP of -0.5, 2.25 and 4.5 per cent for the years to 2011/12, while the RBA forecasts rates of non-farm GDP growth of 0.75, 3.25 and 3.75 for those same years.

- the effect of price changes on demand (informative in the context of price notification)
- economic activity (important for sensitivity analysis)
- technological change
- standard testing for robustness of the models

This model would be used to derive baseline forecasts.

The second stage would entail adjusting the baseline forecast to reflect Australia Post's specific knowledge of customer demand, and to incorporate anticipated behavioural changes that could not be captured in the econometric model. These adjustments should be documented and explanations provided for the quantitative significance of these.

4 Analysis of large letter demand forecasts

In this section, we consider the approaches taken by and on behalf of Australia Post to forecast the demand for the large pre-sort and large ‘other’ letter categories, which together comprise 9 per cent of the reserved letter volumes and about 7 per cent of the total letter volumes.

In this chapter we follow the same structure as in Chapter 3, Analysis of small letter demand forecasts. As necessary to avoid repetition, we refer the reader to relevant sections in Chapter 3. Specifically, Australia Post used the same methodology for developing large letter volumes as it did for small letter volumes. For the description and our critique of its methodology, as well as our suggestions on how it should be improved, the reader should refer to Sections 3.4 and 3.8.

4.1 Information supplied by Australia Post

In the Draft notification (Section 7), Australia Post provided an overview of the main factors driving the large letter volumes. It identified GDP as a main driver of demand for large letters, stating that “the global economic slowdown will be a major threat to large letter volume growth in the short term”.³⁵ It also identified substitution to electronic means of communication as one of the drivers of other large letter volumes.

Australia Post’s view was based on the econometric study undertaken by Diversified Specifics on its behalf. The study, titled “Domestic Large Letter Segment Volume Demand, 1995/96 to 2007/08” (February 2009) was made available to Frontier for this engagement.

As stated in Section 3.1, Australia Post and Diversified Specifics provided clarifications (both in person and in writing) to a number of issues raised by the ACCC and Frontier concerning their forecasting approaches.

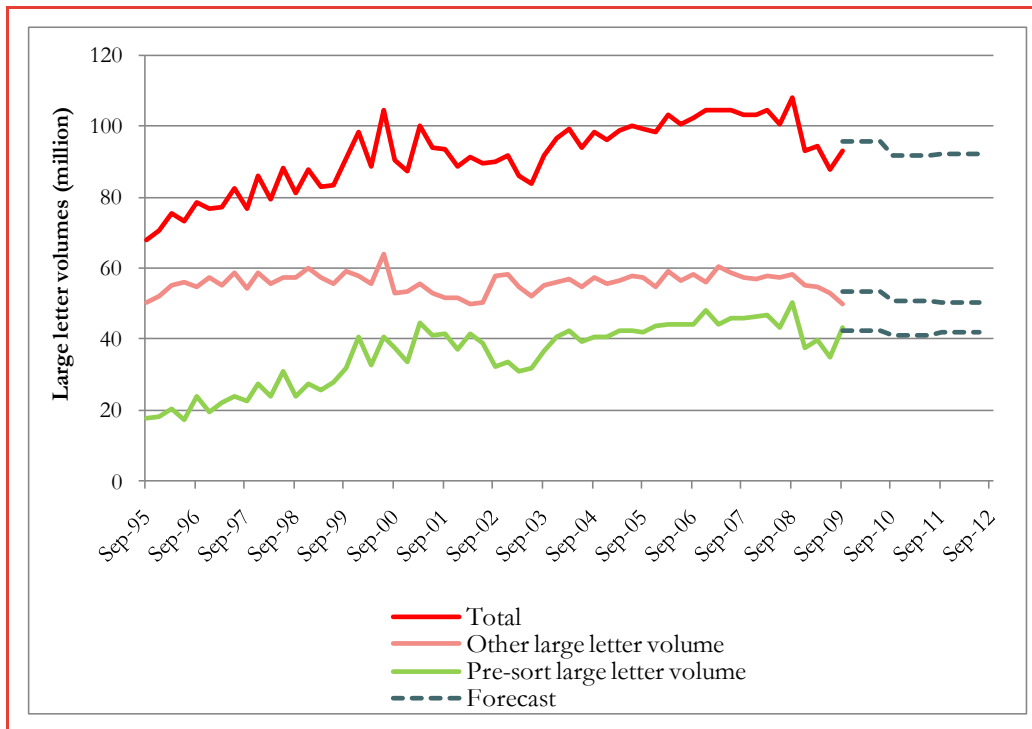
4.2 Trends in historical and projected volumes

Figure 9 presents seasonally adjusted quarterly volumes for the pre-sort and other large letters categories, as well as for total large letters. The historical trend of pre-sort large letters is very similar to the historical trend of pre-sort small letters. Overall, the volumes have grown steadily since 1995, with downward adjustments occurring for a few periods from the third quarter 2002 (around the time of the closure of unbarcoded pre-sort services) and the fourth quarter 2008 (the effect of the global financial crisis). The overall trend in other large letter

³⁵ Draft notification, p. 28.

volumes can be characterised as being relatively flat, with the only prolonged periods of decrease in volumes occurring between the third quarter of 2000 and the second quarter of 2002, and the last four quarters.

Figure 9: Historical and projected trends in large letter volumes (quarterly data)

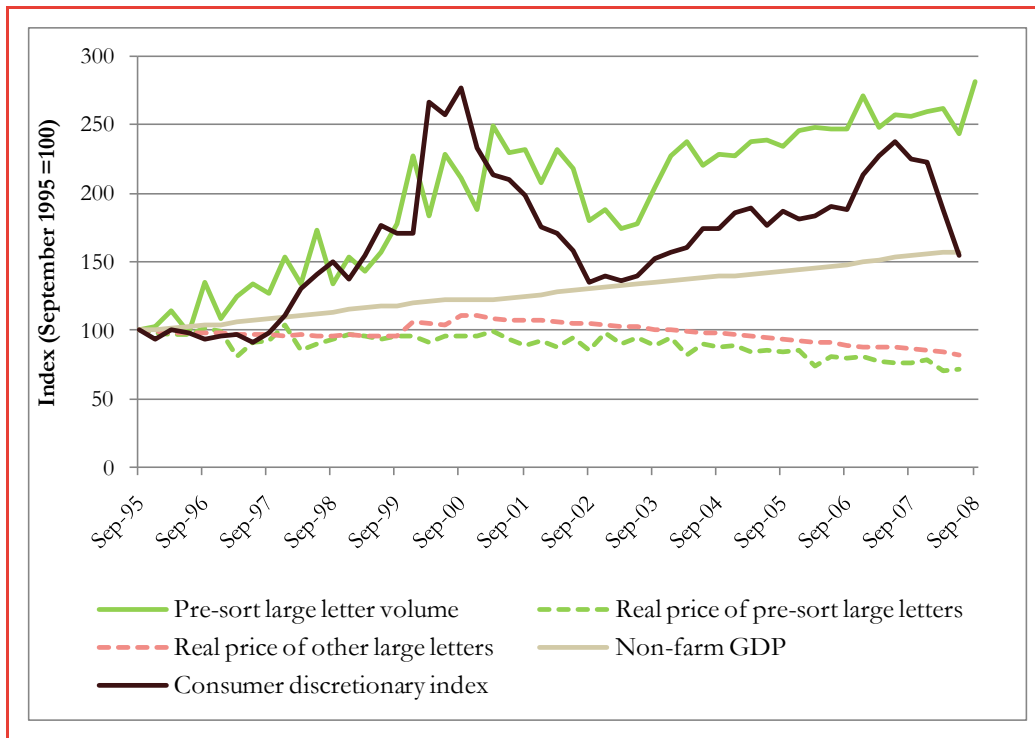


Notes: (1) Historical volume data provided by Diversified Specifics are seasonally adjusted. (2) Australia Post's demand forecasts are made on an annual basis. For the purpose of this figure, quarterly volumes have been obtained by dividing the annual forecasted demand by four. (3) For the third quarter 2009 we present both the forecasted and the actual volumes.

Source: Diversified Specifics, Australia Post

As can be seen in Figure 10, real prices of pre-sort and other letters have been in decline since the beginning of the decade. It is notable that the real price of pre-sort large letters has been much more volatile over the examined period compared to the prices of other three reserved-mail segments. Among other factors postulated to impact the large letter volumes, non-farm GDP and credit card volumes both exhibited a steady upward trend. The consumer discretionary index, which Australia Post and Diversified Specifics use as a proxy for the health of the advertising industry, exhibited most volatility (relative to other drivers) over the examined period.

Figure 10: Historical trends in factors hypothesised to influence large letter volumes



Notes: (1) Volume and GDP indices based on seasonally adjusted data. (2) Indices based on quarterly data.

Source: Diversified Specifics

4.3 Diversified Specifics' analysis

4.3.1 Overview of Diversified Specifics' modelling approach

Diversified Specifics applied the same methodology for determining the preferred specifications of the demand models for large letters as it did for small letters. Namely, it estimated a number of demand models for each letter segment with the explanatory variables chosen to reflect economic activity, price, behavioural and product changes, and a number of exogenous events. Diversified Specifics chose the preferred econometric model for each letter segment based on diagnostic tests and its common sense checks. The key demand drivers and elasticities from the preferred models are presented in Table 3.

Table 3: Diversified Specifics estimated elasticities – Large letters

Explanatory variables	Pre-sort letters	Other letters
Non-farm GDP ¹	1.03	0.22
Advertising industry health measure ²	0.30	NA
Barcode introduction ³	0.16	NA
Closure of unbarcoded pre-sort service ⁴	NA	0.08

Notes: (1) Seasonally adjusted; (2) S&P/ASX 200 Consumer Discretionary Index used as a proxy variable; (3) Binary variable equal to zero before October 1999 and to one afterwards (4) Binary variable equal to zero before September 2002 and to one afterwards; NA – not included in the preferred model.

Source: Diversified Specifics

4.3.2 Critique of Diversified Specifics' modelling approach

Because Diversified Specifics' approach to estimating the demand for small and large letter volumes was essentially the same, our critique of the small letter models (presented in the draft report) also applied to its large letter models. In particular, we raised a concern that best practices in handling time series data were not followed (i.e. data series were not tested for stationarity and cointegration). The subsequent work by Diversified Specifics (i.e. work done in September 2009) as well as its comments on Frontier's draft report addressed this issue only for small letters. The large letters models have not been validated using the same process.

In addition to that issue, we also note that in relation to large letters:

- The effect of technological change (i.e. substitution to electronic means of communication) on other large letter volumes was controlled for by arbitrarily truncating the time series.³⁶
- The trends presented in Figure 9 seem to suggest that the closure of the pre-sort service had a sizeable impact on the pre-sort large letter volumes (with pre-sort large letter users shifting to other large letters). Yet, a dummy variable characterising the closure event was included only in the model for the other large letters and not in the model for the pre-sort large letters.
- Formal tests were not performed to assess whether there were any structural breaks in the data and their exact timing.

³⁶ Diversified Specifics states that movements toward electronic alternatives are “difficult to measure and quantitatively assess in an empirical study such as this” (February 2009 report, p.5). However, we have not found any explanation of why Diversified Specifics selected July 2001 as the starting point for the modelling period, and whether the selection of the starting date had any effect on the robustness of the modelling results.

4.4 Assessment of Australia Post's forecasts for pre-sort and other large letter volumes

As in Section 3.7 on small letter volumes, we now turn to whether Australia Post's forecasts show a significant deviation from historical trends. To assess this, we compared Australia Post's forecasts to a set of benchmarks derived from past volume data. The benchmarks, based on the 1995-2009 data, are a trend line (chosen based on the 'goodness-of-fit' criterion) and values derived through exponential smoothing.³⁷

As stated in section 3.7, after the submission of Frontier's draft report, we became aware that the classification of ordinary and pre-sort letters was not consistent across the data used by Diversified Specifics (and provided to Frontier) and the data used by Australia Post in its price notification. Consequently, Australia Post has provided us with its revised forecasts. This has affected the analysis in this section as well as in Section 5, as the revised Australia Post forecasts are, on average, seven per cent higher for both pre-sort and other large letters compared to Australia Post's original forecasts.

This exercise shows that, for the first year of the price notification period, the Australia Post's forecasts for pre-sort large letters are above the exponential smoothing benchmark volumes, while its forecasts for other large letters are very close to the benchmark volumes. For the remaining two years of the price notification period, Australia Post's forecasts for both types of large letters are below the benchmark volumes.³⁸

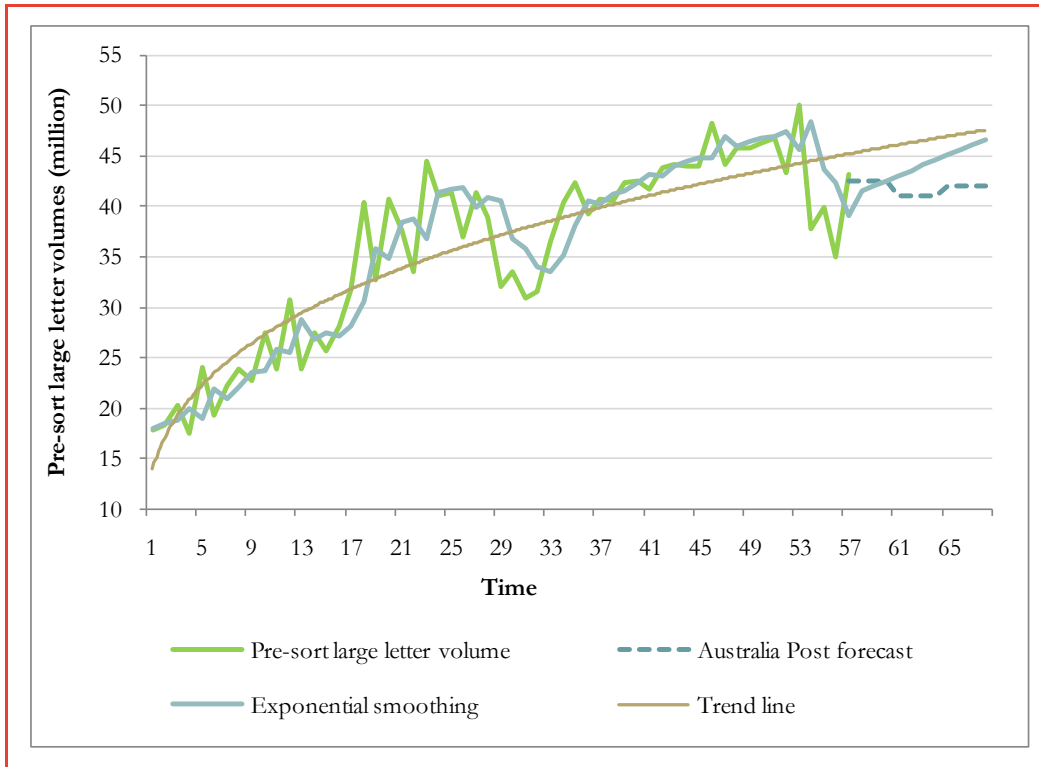
Forecasted other large letter volumes show a continuous decline further away from the historical trend. If Australia Post "[does] not anticipate any radical increase in the rates of substitution or consolidation over the next three years"³⁹ and if, as most recent Reserve Bank of Australia's projections show, GDP is expected to resume its growth path over the next few years, then the deviation from the historical trend of other large letter volumes is questionable.

³⁷ Exponential smoothing was done using EViews (v5), a statistical package, with the smoothing method and the smoothing parameters selected by minimising the sum of squared errors over the modelling period 1995 to 2009.

³⁸ To assess how sensitive the results are to the selection of the modelling period, we re-forecasted the volume trends using 2000/01 as the starting year (see footnote 32 for the explanation of the cut-off point). For pre-sort letters, shortening the modelling period (and using the Holt-Winters method) produced forecasts that were, on average, 4 per cent lower over the price notification period than the estimates derived using the 1995-2009 volume data. These estimates, on average, match Australia Post's forecasts. For other letters, shortening the modelling period (and using the Single exponential smoothing method) produced forecasts that were, on average, 2 per cent lower over the price notification period than the estimates derived using the 1995-2009 volume data. These estimates were still, on average, about 2 per cent above Australia Post's forecasts.

³⁹ Draft notification, p. 26.

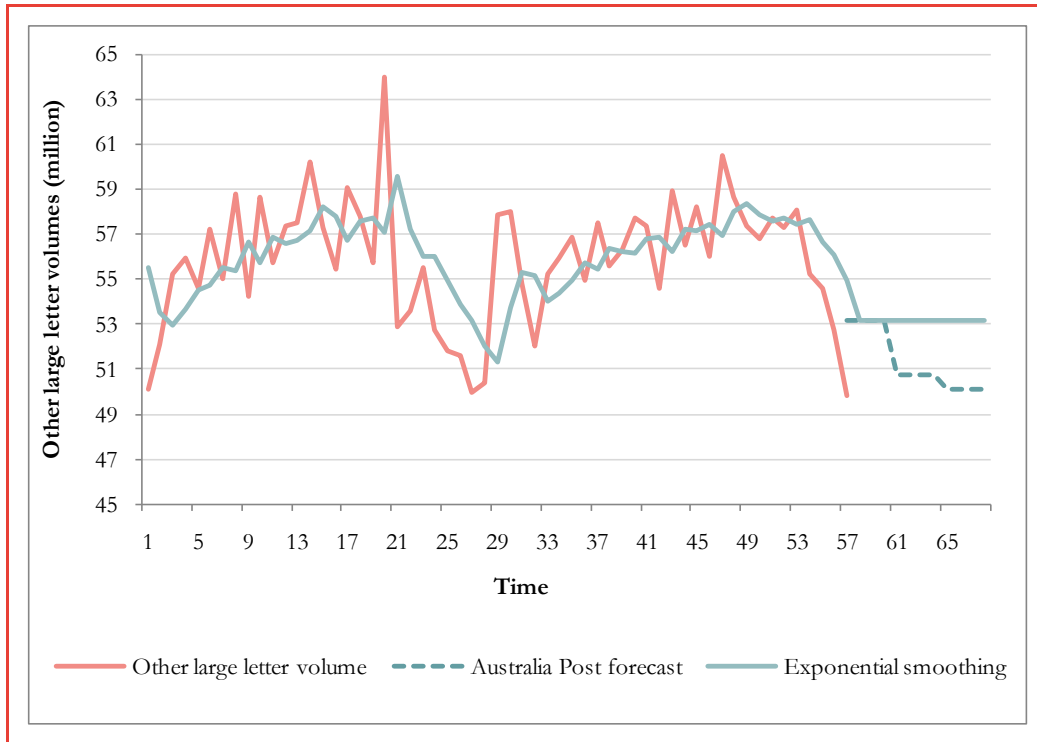
Figure 11: Pre-sort large letter volumes – forecast vs historical trends (quarterly data)



Notes: (1) Historical volume data are seasonally adjusted. (2) The Holt-Winters exponential smoothing method was used. (3) Power trend line was fitted. (4) For the third quarter 2009 we present both the forecasted and the actual volumes. (5) On the horizontal axis: 1 = 3rd quarter in 1995, 5 = 3rd quarter in 1996, etc.

Source: Diversified Specifics, Australia Post, Frontier Economics

Figure 12: Other large letter volumes – forecast vs historical trends (quarterly data)



Notes: (1) Historical volume data are seasonally adjusted. (2) The Single exponential smoothing method was used. (3) Trend line not presented due to poor fit (i.e. R^2 less than 0.1) (4) For the third quarter 2009 we present both the forecasted and the actual volumes. (5) On the horizontal axis: 1 = 3rd quarter in 1995, 5 = 3rd quarter in 1996, etc.

Source: Diversified Specifics, Australia Post, Frontier Economics

We asked Australia Post about its pre-sort large forecasts, particularly in light of the forecast GDP growth that would otherwise be expected to drive increases in pre-sort volumes. It replied:

By comparison [with PreSort small], PreSort large letters will not be positively impacted by the federal election. Instead the election could have some negative impact on PreSort large promotional (some marketers will defer or avoid running campaigns at the same time as significant events as the effectiveness of their messages are diluted). Additionally we expect that over the next 12-24 months business will look to reduce or minimise cost and that this will have a negative impact upon large letter volumes (eg. preference to use small letter instead of large or as in the case of annual reports look to change practices / behaviour). In 2011/12 we believe the position will improve for PreSort Large.

Again no further quantification was provided as to the significance of these effects. We further examine how these deviations from trends affects expected revenues in Section 5.

5 Significance of volume forecasts

To assess the materiality of the deviations of Australia Post's volume forecasts from historical trends, we put the deviations in the context of the PTRM model. Specifically, we calculated how much higher (or lower) Australia Post's annual domestic letter revenues would be (relative to Australia Post's forecasted revenues) if each letter segment followed historical trends.

As we have identified, what we would ideally like to measure is the difference between the existing Australia Post forecasts and a best practice forecasting approach, which would have been to use a model to forecast volumes and then overlay the model results with further information about demand trends that cannot be accounted for within the forecasting model. Comparing Australia Post's forecasting approach to historical trends is clearly second-best to that approach.

5.1 Small letters

Given that Australia Post's forecasts are 1 to 3 per cent below the projected volumes based on historical trends, if demand does in fact follow historical trends, Australia Post's revenues will be higher than predicted using their current forecasts. Our sensitivity analysis indicates that Australia Post's annual domestic letter revenues could be, on average and depending on the trend they follow, between \$6 and \$25 million per year higher than projected by Australia Post (or about 1 per cent higher).

Table 4: Potential impact on Australia Post revenues (in millions) – small pre-sort letters

	2009/10	2010/11	2011/12	3-year total	3-year average
Trend line	\$ 4	< \$ 1	\$ 15	\$ 19	\$ 6
Exponential smoothing	\$ 3	\$ 17	\$ 56	\$ 76	\$ 25

Table 5: Potential impact on Australia Post revenues (in percentage terms) – small pre-sort letters

		2009/10	2010/11	2011/12	3-year average
Trend line	Increase in small pre-sort letter revenues	< 1%	< 1%	2%	1%
	Increase in total small letter revenues	< 1%	< 1%	1%	< 1%
	Increase in domestic letter revenues	< 1%	< 1%	1%	< 1%
Exponential smoothing	Increase in small pre-sort letter revenues	< 1%	2%	6%	3%
	Increase in total small letter revenues	< 1%	1%	3%	2%
	Increase in domestic letter revenues	< 1%	1%	3%	1%

Note: To conduct the sensitivity analysis, we assumed that only small pre-sort letter volumes change, all else was kept equal (all unit costs and remaining Australia Post's forecasted volumes).

Our analysis of projected volumes based on the historical trends does not directly take into account the likely volume effect of the proposed price increase. However, forecasts based on historical trends are likely to reflect the impact of price changes so long as the price changes are not substantially different from those reflected the historical trend. In that context, we note there have been previous increases in real prices that have influenced volumes (including price increases in 2002 and 2008).⁴⁰

For small other letters, Australia Post's forecasts are 1 to 6 per cent above the projected volumes based on historical trends. Our sensitivity analysis indicates that Australia Post's annual domestic letter revenues could be, on average and depending on the trend they follow, between \$6 and \$49 million per year lower than projected by Australia Post (or up to 2 per cent lower).

⁴⁰ In response to our draft report, Australia Post suggested that not taking into account elasticity effects would lead to lower volume trends than those derived from historical observations. As we suggest here, that argument is not correct where historical trends also include elasticity effects.

Table 6: Potential impact on Australia Post revenues (in millions) – small other letters

	2009/10	2010/11	2011/12	3-year total	3-year average
Trend line	(\$ 12)	(\$ 42)	(\$ 95)	(\$ 148)	(\$ 49)
Exponential smoothing	(\$ 4)	(\$ 6)	(\$ 7)	(\$ 17)	(\$ 6)

Note: Parentheses indicate negative values.

Table 7: Potential impact on Australia Post revenues (in percentage terms) – small other letters

		2009/10	2010/11	2011/12	3-year average
Trend line	Decrease in small other letter revenues	(1%)	(5%)	(11%)	(6%)
	Decrease in total small letter revenues	(1%)	(3%)	(6%)	(3%)
	Decrease in domestic letter revenues	(1%)	(2%)	(5%)	(2%)
Exponential smoothing	Decrease in small other letter revenues	(< 1%)	(1%)	(1%)	(1%)
	Decrease in total small letter revenues	(< 1%)	(< 1%)	(< 1%)	(< 1%)
	Decrease in domestic letter revenues	(< 1%)	(< 1%)	(< 1%)	(< 1%)

Notes: (1) To conduct the sensitivity analysis, we assumed that only small other letter volumes change, all else was kept equal (all unit costs and remaining Australia Post's forecasted volumes); (2) Parentheses indicate negative values.

5.2 Large letters

Australia Post's forecasts of pre-sort large letter volumes are, on average, between 4 and 11 per cent lower over the price notification period compared to the estimates derived using the trend line and exponential smoothing methods. Our sensitivity analysis indicates that Australia Post's annual domestic letter revenues could be, on average, \$5 to \$14 million per year higher than projected by Australia Post (or up to 1 per cent higher) if large pre-sort letter volumes did not deviate from the historical trends over the next three years (see Table 8 and Table 9).

Significance of volume forecasts

Table 8: Potential impact on Australia Post revenues (in millions) – large pre-sort letters

	2009/10	2010/11	2011/12	3-year total	3-year average
Trend line	\$ 9	\$ 16	\$ 16	\$ 41	\$ 14
Exponential smoothing	(\$ 3)	\$ 8	\$ 12	\$ 16	\$ 5

Note: Parentheses indicate negative values.

Table 9: Potential impact on Australia Post revenues (in percentage terms) – large pre-sort letters

		2009/10	2010/11	2011/12	3-year average
Trend line	Increase in large pre-sort letter revenues	7%	13%	13%	11%
	Increase in total large letter revenues	2%	4%	4%	3%
	Increase in domestic letter revenues	< 1%	1%	1%	1%
Exponential smoothing	Increase in large pre-sort letter revenues	(3%)	7%	9%	4%
	Increase in total large letter revenues	(1%)	2%	3%	1%
	Increase in domestic letter revenues	(< 1%)	< 1%	1%	< 1%

Notes: (1) To conduct the sensitivity analysis, we assumed that only large pre-sort letter volumes change, all else was kept equal (all unit costs and remaining Australia Post forecasted volumes); (2) Parentheses indicate negative values.

Australia Post's forecasts of other large letter volumes are, on average, about 4 per cent lower over the price notification period compared to the estimates derived using the exponential smoothing method.⁴¹ If large other letter volumes did not deviate from the historical trends over the next three years, we estimated that Australia Post's annual domestic letter revenues could be, on average, \$10 million per year higher (or 1 per cent higher) than projected by Australia Post (see Table 10 and Table 11).

⁴¹ Forecasts based on the trend line method are considered to be unreliable due to poor fit of the trend line (i.e. low R2) and therefore are not presented in this section.

Table 10: Potential impact on Australia Post revenues (in millions) – large other letters

	2009/10	2010/11	2011/12	3-year total	3-year average
Exponential smoothing	\$ 2	\$ 12	\$ 17	\$ 31	\$ 10

Table 11: Potential impact on Australia Post revenues (in percentage terms) – large other letters

		2009/10	2010/11	2011/12	3-year average
Exponential smoothing	Increase in large other letter revenues	1%	5%	6%	4%
	Increase in total large letter revenues	1%	3%	4%	3%
	Increase in domestic letter revenues	< 1%	1%	1%	1%

Note: To conduct the sensitivity analysis, we assumed that only large other letter volumes change, all else was kept equal (all unit costs and remaining Australia Post forecasted volumes).

5.3 Conclusions

Our analysis shows that Australia Post's forecasts of small and large letter segments deviate from volume projections based on historical trends (using both simpler trend methods and using exponential smoothing). For small pre-sort and both segments of large letters, Australia Post forecasts are above the historical trends, while its forecasts for small other letters are below the historical trends. Because the magnitude of the under- and over- projections (relative to historical trends) largely cancel out across the four letter segments, we conclude that Australia Post's average annual revenues over the price notification period are not likely to be materially different to Australia Post's forecasted revenues (less than one per cent).

6 Input cost forecasts

6.1 Introduction

In this section of the report, we consider Australia Post's forecasts of its input costs over the period to 2011/12.

These cost forecasts are inputs to:

- the Post-Tax Revenue Model (the PTRM), which determines whether allowable forecast revenues for reserved services exceed forecast costs
- the study of Australia Post's historic and forecast total factor productivity (TFP), prepared by Economic Insights.

As with to our approach to volume forecasts, we assess the cost forecasts on the basis that Australia Post's methodology for forecasting costs should meet certain standards. These forecasts should ideally:

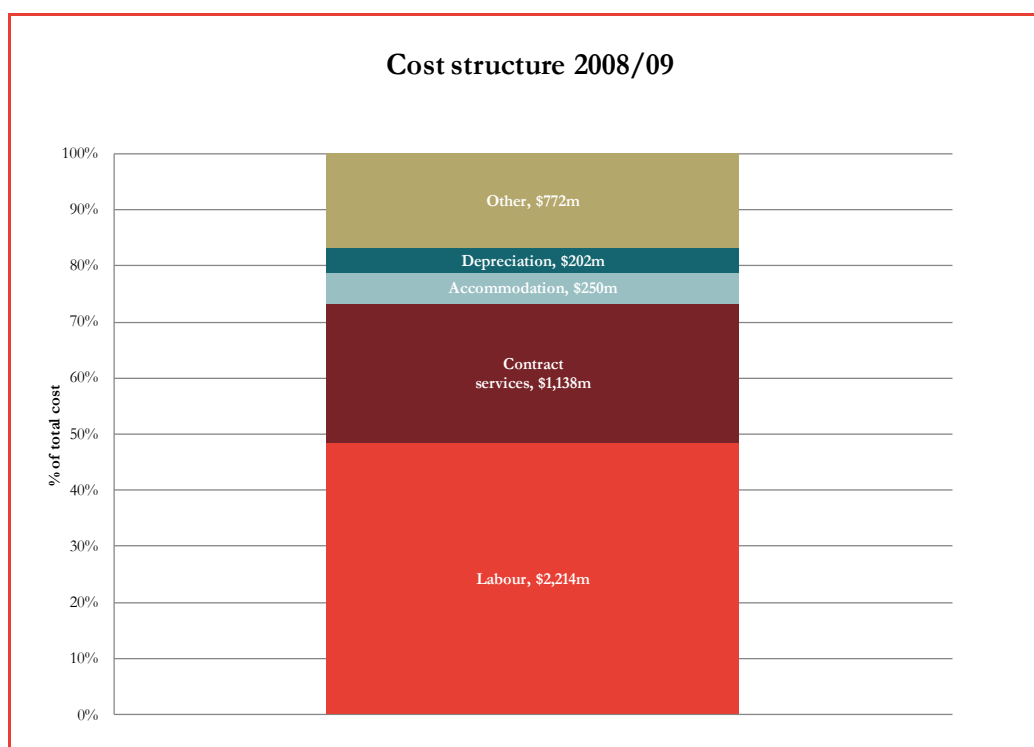
- be clear in their derivation, with key assumptions documented (along with the basis for making them)
- bear some relationship to historical trends, and, where they do not, there should be a detailed explanation about the reasons for, and quantitative significance of, any expected deviations
- allow for some flexibility, so that sensitivity analysis can be conducted.

In the following sections, we outline how the forecasts are presented and used in the Draft notification, the PTRM and in the Economic Insights work, and we check to ensure there is some consistency in the use of input cost forecasts in these different applications. Then we turn to an examination of the forecasts themselves.

6.2 Cost structure and forecasts

Australia Post provides a high level breakdown of its costs for 2008/09 in the Draft notification. This is reproduced as Figure 13. These figures cover supply of both reserved and non-reserved services.

Figure 13: Australia Post's cost structure, 2008/09



Source: Draft notification, p. 35.

Labour is by far the largest cost input. Contract services themselves also contain a very large labour component (contract mail and 'other' contract services).

At 9.7 of the Draft notification, Australia Post identifies a number of planning assumptions which are said to feed into the cost forecasts. These forecasts are reproduced as Figure 14. The key assumptions here are related to wage growth, the number of delivery points and labour numbers. We understand that justification is provided for these forecasts as follows:

- Wage growth of [REDACTED] is said to be consistent with pay increases under Australia Post's Enterprise Bargaining Agreement and relevant ABS benchmarks (Draft notification, p. 38).
- Appendix 17 of the Draft notification provides the basis for the forecast increase in delivery points, indicating a consistent trend in the increase in delivery points.
- Section 9.4. of the Draft notification discusses the trend for falling FTEs. We asked Australia Post about the specific reasons for this (see Section 6.3.1 of this report).

Figure 14: Australia Post's General Business assumptions

	2009/10	2010/11	2011/12
Wage growth (%)	4.0	3<	3<
Delivery points	Continued growth of around 2% (200,000) per annum		
Labour numbers	Annual FTE numbers are projected to decline by an average of 0.5% per annum		

Source: Draft notification, p. 47.

We also sought a breakdown from Australia Post on its costs by function; that is, by the costs associated with retail functions (Sales and Acceptance), transport, sorting / mail centres, delivery and delivery centres (collection, processing and sorting, delivery, head office). The primary reason for seeking this kind of breakdown is because the relevant cost drivers for each function are likely to be quite different. In particular, some functions are likely to be volume-sensitive (particularly mail sorting) while other functions may not be. In an environment of falling volumes, it is important to be confident that Australia Post has accounted for the impact of these volume reductions on costs in the short and medium term.

Australia Post responded to our request by providing a cost and FTE breakdown by function for the 2008/09 year (at the March Review). These data are summarised in Figure 15.

Figure 15: FTE and direct cost breakdown

✂

Source: Australia Post, 14 September 2009 response

These data indicate that:

- The delivery function is the greatest user of resources within Australia Post, so understanding how volumes affect costs within this segment will be particularly important.
- Only just over ■ per cent of cost is mail processing, although the proportion of FTEs is considerably higher at nearly 20 per cent. This means that mail processing is relatively capital-intensive and/or ■ and that any FTE reductions in processing will have a relatively limited impact on total cost.

6.2.1 The post-tax revenue model

The PTRM uses volume forecasts which directly feed into expected revenues, as well as cost forecasts based on input usage (which in turn will depend on demand).

Therefore, changes to volume forecasts may influence both revenues and costs. The relationship between volumes and revenues is reasonably clear, but it is less clear whether costs will change as volumes change. This will primarily depend on the nature of costs – that is, whether they are fixed in relation to demand, or whether they can be varied. This may differ across reserved services and other types of services.

The categories of costs used in the PTRM are ‘operating and maintenance costs’ (O&M) and ‘depreciation’. There is little difference in the trends across cost types. The cost data are also split by type of reserved product. The input cost forecasts are summarised in Figure 16.

Figure 16: Total cost forecasts in the PTRM

✂

Source: Australia Post

A priori, we would expect total costs to trend with volumes. [REDACTED]

We also note that the data in the PTRM relating to forecast O&M costs references other spreadsheets that were not provided to us, and the derivation of these forecasts are not otherwise clearly explained. However, as we discuss further below, these forecasts are quite similar to those supplied by Economic Insights and which appear to derive from the corporate plan.⁴²

We noted in the draft report that the cost trends indicated in the PTRM are quite concerning when compared with the downturn in volume forecasts. That is, there is a suggestion here that the relationship between costs and volumes is negligible. Indeed, as volumes fall, costs increase.

In a world of falling volumes, a static or rising, cost base will lead to ever increasing average costs, which may require higher prices which in turn may trigger an even greater reduction in volumes. This is not likely to be sustainable, and Australia Post will need to significantly reduce its cost base in the medium term. Further analysis is therefore required to understand whether Australia Post is adequately responding to the challenges of lower volumes by producing a plan that manages the cost base in the light of those market conditions.

⁴² Spreadsheet ‘Reserved Service History June 17.xls’

Australia Post's response

Australia Post noted that the relationship between cost rises and volume and other cost factors has been covered in Australia Post's response to the ACCC's Issues Paper on 18 September. Areas of volume-based cost variability were set out in section 4 of that response, and main cost assumptions were set out in section 6 of that response.

The combined problem of cost inflation, falling letter volumes and a high degree of fixed cost imposed by the prescribed performance standards is one that is now facing many, if not all, postal authorities in the OECD.

Frontier response

We note Australia Post's response and the further factors it refers to in its 18 September response. We recognise that the relationship between costs and volumes may well be quite weak in the short term. Our concern, as we discuss later in this section, is that Australia Post's cost forecasts appear to imply a relationship between costs and volumes that is close to zero. Even if likely in the short term, it is then necessary to ask what measures the operator is putting in place to manage its cost base over the medium term given the expectation of much lower volumes. These might include: rationalisation of mail centres or delivery offices, re-optimisation of delivery routes, greater use of flexible labour, etc.

6.2.2 Total Factor Productivity study

Economic Insights has produced an analysis of Australia Post's historical productivity and produced forecasts as to likely TFP gains over the three-year pricing period. This covers both total TFP estimates as well as TFP estimates for reserved services. We focus here on reserved services.

From our review of the Economic Insights documentation and spreadsheets provided to us by Australia Post, we understand that Australia Post provided Economic Insights with forecasts of its costs, contained in a number of different spreadsheets, in the following categories:

- labour FTEs and labour costs
- contractor costs
- capital costs (depreciation).

A fourth category of 'Other' costs is calculated by Economic Insights as a residual by subtracting labour costs, contractor costs and depreciation from total reserved letter costs.

The results of the study for reserved services are summarised at Table 4, and reproduced below.

Figure 17: Results of Economic Insights TFP study – reserved services

Table 4: Australia Post's reserved service output, input, TFP and partial productivity indexes, 1997–2012

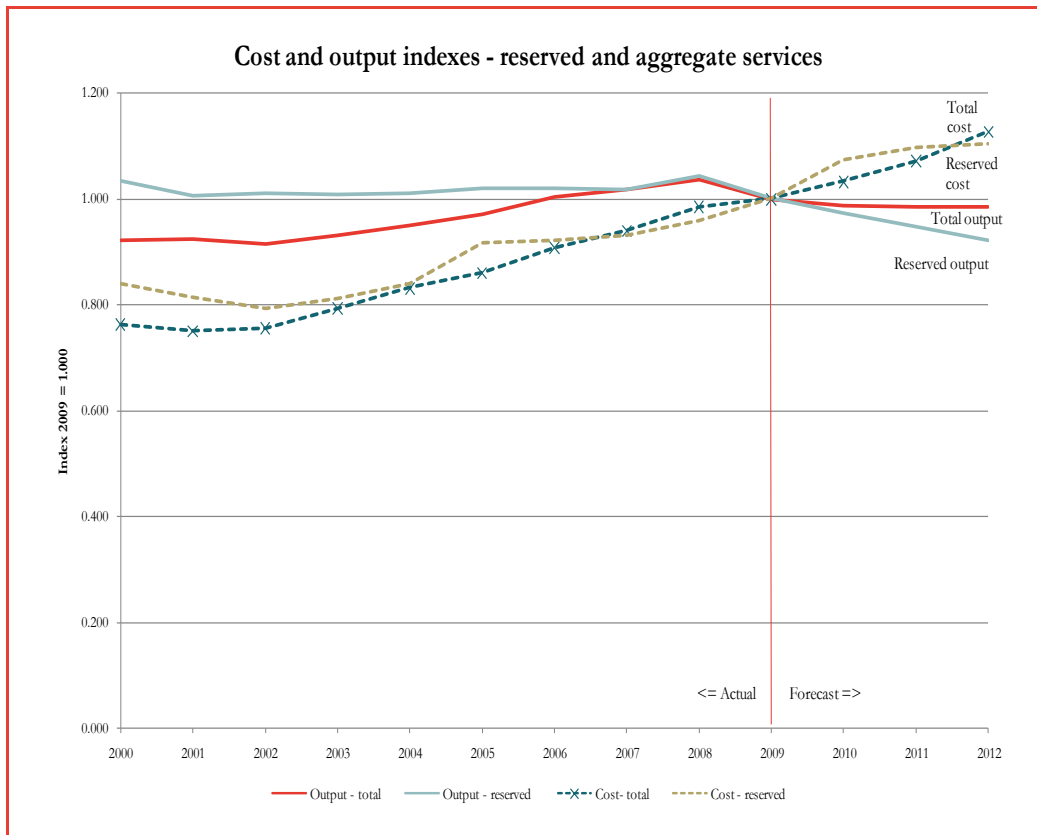
	<i>Output Quantity Index</i>	<i>Input Quantity Index</i>	<i>TFP Index</i>	<i>Partial productivity index of:</i>			
				<i>Labour</i>	<i>Contract</i>	<i>Capital</i>	<i>Other cost</i>
1997	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1998	1.034	0.997	1.036	1.054	0.995	1.027	0.999
1999	1.067	1.009	1.058	1.109	0.977	1.020	0.956
2000	1.125	1.014	1.110	1.195	1.013	1.077	0.910
2001	1.096	0.975	1.124	1.176	0.933	1.033	1.124
2002	1.100	0.938	1.172	1.229	0.912	1.082	1.191
2003	1.097	0.927	1.183	1.235	0.939	1.081	1.228
2004	1.101	0.940	1.172	1.252	0.966	1.082	1.079
2005	1.109	0.927	1.196	1.278	1.031	1.152	1.046
2006	1.109	0.913	1.215	1.287	1.027	1.159	1.111
2007	1.107	0.905	1.223	1.304	1.062	1.179	1.072
2008	1.136	0.904	1.256	1.323	1.136	1.210	1.128
2009	1.089	0.897	1.214	1.277	1.155	1.109	1.086
2010	1.060	0.896	1.183	1.248	1.119	1.054	1.062
2011	1.033	0.884	1.169	1.238	1.110	1.025	1.039
2012	1.004	0.861	1.167	1.225	1.099	0.939	1.115

Source: Economic Insights estimates

The data indicates that the forecasts are for falling quantities of both inputs and outputs from 2009 to 2012. However, output reductions (-2.7% per year) are greater than input reductions (-1.4% per year), with a resulting decline in forecast TFP.

We are also able to use the data provided to Economic Insights to examine the trends in costs across reserved and non-reserved services and how these related to changes in output volumes. The following figure shows that the outlook for volumes is quite negative relative to historical trends, but the cost trends are positive. For reserved services, declines in output relative to aggregate are not matched by relative cost declines but rather, by increasing costs. As discussed above, this cannot be sustained in the longer term.

Figure 18: Costs and output trends



Source: Frontier analysis of Economic Insights TFP spreadsheets

It is also important to ensure that the data provided to Economic Insights to conduct its TFP analysis is consistent with the data used in the PTRM.

As noted above, the PTRM contains a breakdown of costs by product rather than by type of cost, as used by Economic Insights. However, these costs should be consistent in aggregate across reserved services. We attempted to reconcile the Reserved Letter cost in the PTRM (by letter type) with the data in the spreadsheet 'Reserve Service History 2009 June 17.xls' supplied by Australia Post and subsequently used by Economic Insights in its work. Although there is some minor variance by letter category, the total costs and forecast costs for reserved services used in the PTRM and in the TFP analysis are within 1 per cent. We understand these variations may relate to more recent data being available for use in the PTRM.

Table 12: Comparison of data used in PTRM and supplied to Economic Insights

Cost forecasts ('Total Expenses')				
	2008/09	2009/10	2010/11	2011/12
PTRM figures (\$m)				
Small Letters Ordinary	✂	✂	✂	✂
Large Letters Ordinary	✂	✂	✂	✂
Small Letters Presort	✂	✂	✂	✂
Large Letters Presort	✂	✂	✂	✂
Total reserved	1,962.3	2,050.8	2,076.5	2,093.9
Economic insights (excl. International in) (\$m)				
Small Letters Ordinary	✂	✂	✂	✂
Large Letters Ordinary	✂	✂	✂	✂
Small Letters Presort	✂	✂	✂	✂
Large Letters Presort	✂	✂	✂	✂
Total reserved	1,961.8	2,049.8	2,096.8	2,109.7
Variance – total reserved	-0.03%	-0.05%	0.97%	0.76%

Source: Australia Post – PTRM and Economic Insights TFP analysis spreadsheet

6.3 Input cost forecasts

We now turn the input forecasts themselves. There are two main categories – operations and maintenance costs, and capital costs. Within operations costs, labour is the major cost category.

6.3.1 Operations and maintenance costs

Labour – quantity and price

Australia Post notes in its Draft notification (p. 36) that at around 48 per cent of total costs (2008/09), labour costs are by far the largest single cost item. This holds even more strongly for reserved services, with labour costs constituting 68 per cent of total costs in 2008/09.

Forecasts for labour quantities and costs were provided by Australia Post to Economic Insights for reserved services⁴³ and in aggregate⁴⁴. These are shown in

⁴³ Spreadsheet 'Res and Non-Res Labour 2009.xls'

the figure below, together with historical trend data that has been derived by Economic Insights using Australia Post data provided to it for earlier studies.

Figure 19: Quantity and cost forecasts for labour – reserved services



Source: *Economic Insights TFP spreadsheet and ABS labour price series, 6345.0*



We asked Australia Post how its FTE and labour costs forecasts were derived. Australia Post responded that:

With one exception, all financial and FTE data for the three years to 2011/12 were compiled at individual work centre level. This was the first occasion when the normal annual budget was extended to be a full three-year budget.

For both labour and contractors, no particular forecast methodology was imposed on the individual work centres. Each work centre forecast its FTE and cost outlook according to its own expected work programme and the results were then aggregated to corporate totals.

The exception to this disaggregated budgeting was superannuation expense, which was advised at the corporation level by the actuary.

We further asked Australia Post about the forecast reduction in FTEs. It responded that:

FTEs directly employed in the reserved domestic letter service are budgeted to reduce. As indicated previously to the ACCC, the net number of FTE reductions planned for the next three years in mail processing and delivery is approximately 600. Most of that reduction will come from domestic reserved service FTEs.

In addition to the actual reductions, with domestic reserved letter volumes falling but total volumes of non-reserved service items rising, remaining direct, indirect and overhead FTEs will be allocated less to domestic reserved letters and more to other services which flow through the network.

Australia Post also provided some explanation of the factors affecting wage outcomes and labour usage in Section 9 of the Draft notification. In particular, Australia Post suggest that wages (which account for 82 per cent of the total labour cost in 2008/09) under its enterprise bargaining agreement [redacted]

44 Spreadsheet 'Staff and Contractor FTEs 2009 May 15.xls'

In Figure 20, we plot the ABS Labour Price Index⁴⁵ with historical values until June 2009 (rebased as an index), and compare these to the Labour Prices implied by the labour cost data for reserved services supplied to Economic Insights (i.e. total labour costs divided by FTEs). This illustrates that the historical growth in Australia Post labour prices has been somewhat slower than the ABS benchmark,

This may in part be attributable to our measurement of labour prices for Australia Post including non-wage factors (such as superannuation expenses) which are forecast to increase by some \$60m in 2009/10 (see Table 9 at p. 41 of the Draft notification).⁴⁶ These costs increase from around 2 per cent to 4 per cent of total labour costs.⁴⁷

Figure 20: Actual and forecast labour prices – reserved services

✂

Source: *Economic Insights TFP spreadsheet and ABS labour price series, 6345.0*

Contractors – quantity and price

The data used by Economic Insights also contains (hard-coded) forecasts of changes in contractor costs related to reserved services. These are reproduced in Figure 21 together with a linear trend line. Quantities of contractors used for reserved services are also derived in the Economic Insights study, by using the same relationship that applies between costs and number of contractors at the aggregate level and then applying this to the dollars spent on reserve service contractors.

Figure 21: Costs of contractors for reserved services

✂

Source: *Economic Insights TFP spreadsheets*

In our draft report, we noted that broadly speaking these trends appear to be consistent with historical trends, although contractor volumes appear to be levelling off relative to trend. Further examination of the aggregate data (see Figure 22) reveals that contractor volumes across the business are expected to remain constant over the forecast period. We also noted that

⁴⁵ We use the series “Quarterly Index ; Total hourly rates of pay excluding bonuses ; Australia ; All industries ; Private ; All occupations.”

⁴⁶ This figure is a total across all of Australia Post.

⁴⁷ Using the forecasts in Table 9 on p. 41 of the Draft notification, and figures supplied on labour costs to Economic Insights.



Figure 22: Contractor costs and volumes - aggregate



Source: *Economic Insights TFP spreadsheets*

Australia Post response

Australia Post comments that Frontier's expectation about contractor costs rising in line with wages does not reflect the experience that AP has with contractors. Factors driving contractor cost escalation were set out in section 9.6.2.2 of AP's draft notification. This section reads as follows:

The work effort has been relatively stable for roadside mail delivery over time. However, with the growth in parcel volumes and delivery points the workload for parcel and street mail contractors has grown steadily. These growth factors feed directly into contract costs over time.

In addition, the ability of contractors to renegotiate contract payment rates, and even to terminate contracts early, has placed contract costs under extra pressure for some time.

In addition to volume and points growth factors, contract costs have significantly increased because of wages, fuel and other escalation factors against a background of the tightening labour market throughout most of this decade. Although particular states have been relatively more affected by contract rate pressures, the issue is widespread.

Frontier response

It is apparent from the data that [REDACTED]

[REDACTED] We still have a concern that the reasons given by Australia Post do not provide a justification for future rises. Given the general downturn in both the broader economy and in postal volumes, it seems this is a key area where cost restraint must be exercised.

Other costs – quantity and price

Other costs as defined here include expenses not related to labour, contractors or depreciation. They may overlap, but not completely align, with the categories of cost discussed in the Draft notification at page 46:

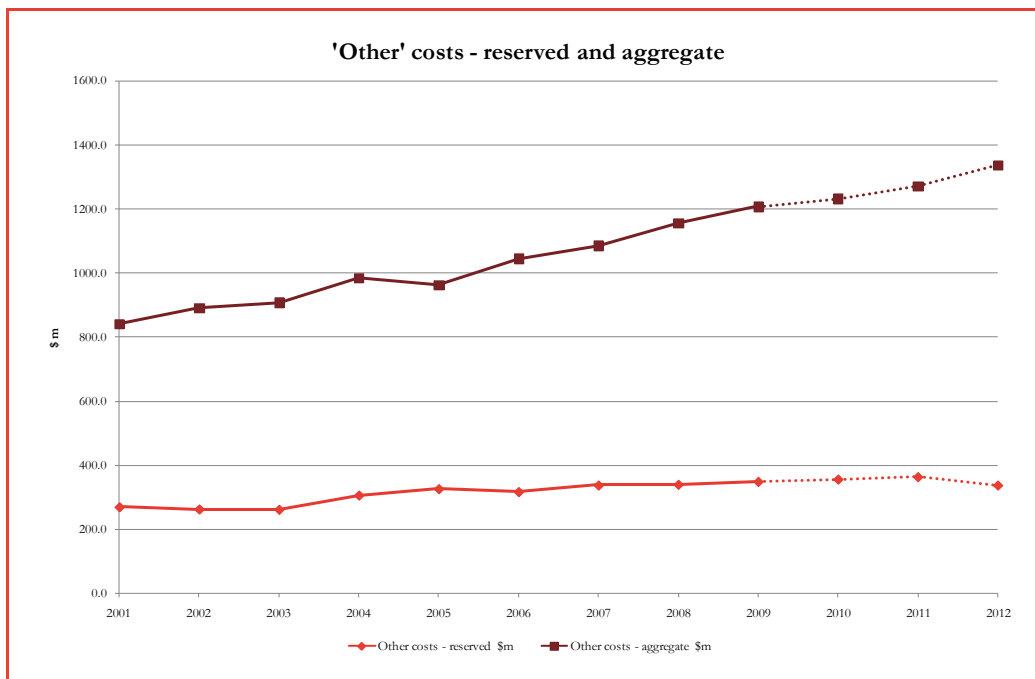
- staff associated costs
- accommodation
- cost of goods sold
- statutory and legal payments

- motor vehicle costs
- communications
- bank fees and charges
- general material purchases
- other miscellaneous expenses.

At an aggregate level, Economic Insights uses data from Australia Post's General Ledger accounts to capture these other costs (by deducting labour and contractor costs from GL non-capital costs). At a reserved level, Economic Insights appears to have calculated these other costs by deducting labour, contractor and depreciation costs from total expenses as per the 'Reserved Service History' spreadsheet. Hence, the two calculations may not be entirely consistent (that is, they may not capture the same kinds of costs).

Bearing this in mind, we show the forecasts in Figure 23. These are plainly in line with historical trends.

Figure 23: Other costs - reserved and aggregate



Source: Economic Insights TFP spreadsheet

In the Draft notification, Australia Post comments that expenses for the items in the list on p. 46 are forecast to grow at an annual average of █ per cent per annum. That appears to be consistent with the results we derive in aggregate using the Economic Insights data. For reserved services, the forecast is for these costs to fall slightly. Both of these forecasts appear consistent with the historical trends.

6.3.2 Capital depreciation

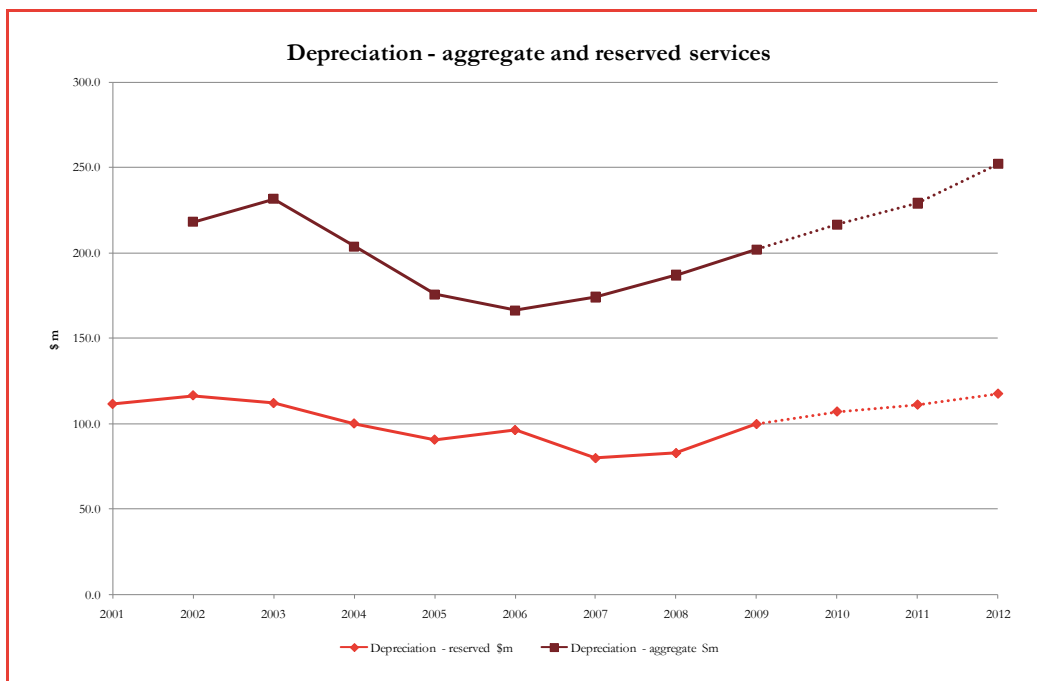
Depreciation costs are not a large part of Australia Post's cost base. They account for around 5 per cent of annual costs, as indicated in Figure 13.

In the Draft notification, Australia Post notes that depreciable property, plant and equipment assets are written off to residual values using the straight-line method of depreciation (p. 46)

We suggested in our draft report that, as it is not a cash cost, there is an element of subjectivity as to how depreciation costs are represented in any one year. Australia Post responded by suggesting that under its accounting policies there is no subjectivity as it uses straight-line methods of depreciation. Australia Post further stated that it tests our asset lives and residual values annually, and these are subject to independent scrutiny by its external auditors each year in assembling the statutory financial statements.

The historic and forecast depreciation data are shown both at an aggregate level and for reserved services in Figure 24. Earlier periods in the series show a decline in depreciation in both data sets. Since that time, the trend is clearly upwards, commencing its upswing from the 2006/07 financial year. The forecast levels do not look out of line with these more recent trends.

Figure 24: Depreciation – actual and forecast across reserved and aggregate services



Source: Economic Insights TFP analysis and General Ledger

6.3.3 Australia Post comments on input cost assessment

Australia Post commented on our draft report that it was unclear what we were proposing in our analysis of costs. It suggested that:

Mechanistic approaches to budgeting are probably rarely used in the commercial world, and they are not likely to be adopted by AP. In our experience budgeting is a process of negotiation across all areas of the business, with work programmes rarely static enough to make simple extrapolation viable.

6.3.4 Frontier response

We consider that, similar to the approach adopted to volume forecasts, for regulated businesses ‘mechanistic’ approaches are preferable to subjective and non-transparent forecasts which cannot effectively be reviewed. Again, we note that such processes are relatively standard in regulatory processes – as per the recent AER decision on NSW distribution businesses (2009, see in particular section 8 and appendix L).

6.4 Relationship between costs and volumes

6.4.1 Frontier’s draft report analysis

In our draft report, we noted that a key concern with the Draft notification was that Australia Post forecasts declining volumes but its costs do not fall in line with volumes.

Australia Post justifies this with regard to its particular functions in Annex 11 of the Draft notification. It discusses cost drivers with regard to the following functions:

- Sales and Acceptance.
- Processing.
- Transport.
- Delivery.

The key driver of cost in relation to the Sales, Transport and Delivery functions is the prescribed performance standards that Australia Post must meet, affecting both points of presence and delivery standards.

Although we recognise that Australia Post does have exacting service standards to meet, we have some concerns that scope for cost savings may have been underestimated, for two reasons:

- Australia Post has historically exceeded all of its customer standards (in some cases by a large margin). If Australia Post's costs are variable to the performance of these standards, then exceeding the standards may come at an efficiency cost. For example, it seems quite conceivable that reducing the number of postal boxes closer to the minimum standard would reduce collection costs.
- There are several available international studies which derive relationships between costs and volumes for different postal functions. This relationship is captured in a 'cost-volume elasticity', which measures the percentage change in cost from a small percentage change in volume. For example, if a 1 per cent increase in delivery volume led to a 0.5 per cent increase in cost, that would be a cost-volume elasticity of 0.5. Australia Post has implicitly assumed a cost-volume elasticity of 0. However, the international studies on mail delivery functions conclude that while the cost-volume elasticity is likely to be less than 1.0, implying that there are 'economies of density' in mail delivery, the cost-volume elasticity is significantly different from 0.
 - The LECG study prepared for PostComm using Royal Mail network data estimates an elasticity of 0.65-0.70 (Moriarty et al, 2006, p.176).
 - NERA's study across the ten original EU nations estimated an elasticity of 0.65 across letters and parcels (NERA, 2004, pp. 123-124).

Processing of mail appears to be one area where lower volumes of mail should have a greater influence on cost. This is because where manual intervention in processing is necessary, lower volumes should reduce labour hours and therefore labour costs (reflected in either fewer FTEs or reduced overtime). This seems to have been a particular issue in the United States, where according to Fenster et al. (2008, p. 317):

Beginning in 1997, USPS has presented econometric studies in five successive rate proceedings to support the contention that mail processing labour variabilities are less than 100 per cent. This evidence has been rejected by the PRC [Postal Rate Commission], which continues to use variabilities close to 100 per cent based on an assumption that work hours vary mostly in proportion to volumes processed.

A recent article by Bozzo (2009, p. 237), a US consultant for the USPS, again presents econometric work that finds "the traditional assumption [used by the PRC] that sorting costs will decline in direct proportion to processing volumes overstates the flexibility of USPS costs under stagnant or declining volumes." While he finds that a cost-volume elasticity of 1.0 is too high, for all of the letter types he investigates the cost volume elasticity is above 0.68.

Further, an extensive LECG study (described in detail in Moriarty et al, 2006) prepared for PostComm finds that for the UK, cost-volume elasticities are over one (depending on the size of the mail centre). This study used information on

70 mail centres across the UK and econometrically-estimated cost functions using independent variables such as volumes and mail destinations.

While Australia Post appears to recognise volume of mail processed as a key cost driver at p. 83, it also claims that there are constraints to the amount of cost that can be reduced:

- the requirement to collect from all lodgement points, regardless of volume, constrains the ability to commence processing earlier;
- labour resource reduction depends on the type of letter, eg an SPB letter requires more processing steps and resources than PreSort Letters;
- although letter volumes have declined there is still volatility in the pattern of lodgements from businesses on a day by day basis, and it is not possible to fine tune rostered resources to match volume variations; and
- type of mail processing equipment;
 - o usage of CFC and MLOCs may reduce with declining volume, however:
 - equipment set up and clear down times are relatively fixed; and
 - equipment decommissioning opportunities require large and permanent volume decline.
- usage of BCS is far less variable with volume – there will be some reduction in run times, but all BCSs must be operated to the appropriate sort plan.

We make two points in response:

- It would have been preferable for Australia Post to demonstrate some of these points by pointing to its actual experience with changes in volumes. Econometric studies would provide more rigorous and quantifiable evidence of the relationships. There is also no sensitivity analysis applied to forecast what might happen in particular cost categories if such relationships do exist. As it stands, it is difficult to assess the statements that are made because they are not quantified.
- Australia Post also makes no distinction here between the short run and the long run. Our view is that low cost-volume elasticities are plausible in the short run (implying relatively modest cost reductions), as it takes time to re-schedule operations and to re-deploy labour. However, low cost-volume elasticities become more difficult to justify as one moves towards the medium to longer term. In the medium-to-longer term, Australia Post could, for example, choose to invest in more scalable processing equipment. This is perhaps difficult to address within the context of a three-year forecast but is something that is clearly necessary to consider in the longer term.

As we state earlier, in a world of falling volumes and fixed costs, higher prices will be required for Australia Post to earn a return but there is some doubt as to whether this is a sustainable strategy. Australia Post may well need to significantly

reduce its cost base in the medium term, but cost reductions are not yet evident in its cost forecasts. This will place a greater burden on any future attempts by Australia Post to lower costs in the longer term.

6.4.2 Australia Post response

Australia Post reacted strongly to our suggestion that it might have to look at reducing service standards in order to lower costs.

It noted that such a strategy would give rise to several issues, including

- having standards close to the minima creates new problems for AP, because if we fall below a standard then we are required to lodge a service improvement plan in the Parliament – incurring a considerable cost; and
- reducing service standards is likely to have a negative customer impact – which would place further pressure on letter volumes.

Australia Post also argued that reducing the number of street posting boxes, which we provided as an example of how costs might be reduced, would in fact reduce costs very little in the long term because the vans would still have to cover the same kilometres.

6.4.3 Frontier response

Clearly, reducing service standards is not something that is desirable as a matter of course. We understand Australia Post's view that cutting costs is unlikely to be straightforward and that it must take into consideration stakeholder reactions in cost reductions strategies. Nonetheless, as we have emphasised, if Australia Post genuinely considers that the long-term volume trends are as negative as it suggests in the draft notification, then Australia Post must respond to this challenge of lower volumes by producing a plan that manages the cost base in the light of those market conditions.

6.5 Conclusions on input cost forecasts

By the standards that we have outlined in the introduction, there are some deficiencies in the approach to forecasting adopted by Australia Post.

From a purely mechanical perspective, the derivations of the forecasts used in the PTRM and in data provided to Economic Insights are unclear. There are a number of instances where forecast data is hard-coded, and linkages exist within the spreadsheets referring to other files which have not been provided. There is also little description of how particular work centres within Australia Post have derived their forecasts or whether consistent approaches were used across work centres.

We are also concerned that Australia Post has not appeared to apply any sensitivity analysis to its forecasts (for example, to model the impact of

significantly lower volumes – perhaps brought on by the higher proposed prices - on its costs).

Our major concern with the forecasts themselves is that while the cost forecasts used by Australia Post do not appear to be significantly out of line with historical trends, they imply a negligible relationship between costs and volumes. An inability to reduce costs as volumes fall is likely to be a significant problem for Australia Post in future.

7 Conclusions

The purpose of our study has been to critically assess the approach taken by Australia Post to forecasting future mail volumes, operating costs and other input data.

Our conclusions are as follows:

- Australia Post has an incentive to under-forecast volumes. It is effectively rewarded for under-forecasting and therefore there is a need to rigorously review the forecasts that have been adopted.
- Australia Post's methods for forecasting volumes are not based on a rigorous framework designed to produce accurate forecasts; rather, they evolve from commercial decision-making, and the various processes of derivation and review are not clearly and transparently documented. They are also not based on any statistical modelling, although some account has been taken of econometric work on drivers of Australia Post's demand. Nor are the forecasts amenable to sensitivity analysis on the key expected drivers of demand. It has therefore proven difficult to critically assess the veracity of the forecasts adopted.
- We have therefore concluded that we should be sceptical of the Australia Post volume forecasts where they show marked divergences from historical trends. This is not on the basis that historical trends will always provide the most accurate indication of the future. Rather, it is because otherwise we have no ability to critically analyse the forecasts at all.
- The forecasts do not explicitly take into account the effect of the proposed price increases on expected volumes, although we understand that managers were provided with 'price guidance' in setting volume forecasts. If price elasticity was not taken into account in setting the volume forecasts, then this is a potentially significant flaw (which would tend to bias the forecasts upwards). Although we are unable to conclude how large the effect of the proposed volume fall would be, Australia Post's consultant's econometric models find a significant historical relationship between real prices and the volumes of some letter types.
- The modelling work of Australia Post's consultants, Diversified Specifics, was not specifically designed for forecasting mail volumes, but was used to inform Australia Post about historical trends. Although the work itself may have value, it is difficult to place this work into context because it does not explicitly link to Australia Post's forecasts.
- On the forecasts themselves:
 - Although Australia Post forecasts that pre-sort small letter volumes will stay relatively flat over the price notification period, the forecasted

volumes are below the short to medium term trend. On the other hand, other small letter volumes do not look to deviate from the historical trend.

- Both types of large letters are forecast to be below their historical trends.
- We then assessed how Australia Post's annual domestic reserve letter revenues deviated from those that might be expected if volumes followed the historical benchmarks. This analysis provides a range of values, and we conclude that in revenue terms the expected value of any under-forecast is not material.
- Similar to its demand forecasts, the input cost forecasts (usually consisting of a quantity variable and possibly a price variable, such as FTEs and wages to derive labour costs) are not derived using a statistically rigorous methodology. This has made it difficult to assess the forecasts, and we have consequently examined the forecasts primarily against historical trends.
- In broad terms, the cost forecasts are in line with historical trends. However, given the forecast declines in letter volumes, this is problematic. It implies little to no relationship between the forecast lower volumes and Australia Post's costs.
- Such an outcome would only be plausible if costs were completely inelastic to volume, and our reading of Australia Post's statements is that while much of the network cost is fixed due to the need to maintain regulated delivery standards, some cost savings are possible, particularly in the medium term. Overseas studies of delivery and sorting functions also indicate that while there are economies of density (that is, costs fall proportionally less than volumes), there should be some reduction in costs from lower volumes.

Annex A

Unit root tests

We performed unit root tests on the variables included in Diversified Specifics preferred demand models and found that these variables were integrated of order 1 (i.e. they were made stationary after the first difference).

Table A - 1: Unit root tests

Variables ¹	Levels		First difference	
	Augmented Dickey-Fuller test statistic ³	Reject null hypothesis of unit root ⁴	Augmented Dickey-Fuller test statistic ⁵	Reject null hypothesis of unit root ⁶
Other small letter volumes²	-2.40	No	-10.81	Yes
Pre-sorted small letter volumes²	-1.98	No	-10.73	Yes
Non-farm GDP²	-1.60	No	-8.04	Yes
Credit card volume²	-2.43	No	-7.16	Yes
Real price of other small letters	-2.20	No	-7.35	Yes

Notes: (1) Variables are in logs. (2) Seasonally adjusted. (3) Trend and intercept included in test equation. (4) Test critical value at 5% level = -3.5. (5) Intercept included in test equation. (6) Test critical value at 5% level = -2.92.

Source: Frontier Economics

Time series data

It is well understood by econometricians that using non-stationary time series data⁴⁸ in regressions may lead to spurious results – results which erroneously indicate, through misleading values of R-squared and t-statistics, that there is a meaningful relationship among the regression variables. It is therefore a standard procedure to test time series data for stationarity (i.e. to perform what is known as the ‘unit root’ test) and, if the variables are found to be non-stationary, to choose an appropriate statistical approach to mitigate against spurious regression findings.

When time series data are found to be non-stationary, it is a standard procedure in econometrics to test whether the related series are co-integrated; that is, whether there exists a stationary long-run linear combination of these non-

⁴⁸ In non-stationary data, the current period’s value is equal to the last period’s value plus a random error. As a result, the mean and the variance of the data are not constant over time.

stationary variables.⁴⁹ If, in fact, the parameters are co-integrated, the presence of non-stationary variables is not considered to be problematic.

⁴⁹ Non-stationary series could be made stationary by using differencing. However, by estimating the model with differenced variables, one would lose information from economic theory concerning the long run equilibrium properties of the data. A growing literature on the subject has shown that cointegration and error correction are more appropriate and useful ways to analyse trending variables (See, for example, Green 2003).

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