

Domestic Large Letter  
Segment  
Volume Demand

1995/96 to 2007/08

Public Document



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diversifiedspecifics

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## **Key Findings**

### Domestic Large Letter Segment Volume Demand 1995/96 – 2007/08

#### **Overview**

As part of a comprehensive investigation into letter volume demand at Australia Post, Diversified Specifics conducted a detailed econometric analysis of domestic segmented large letter volumes over the 1995/96 to 2007/08 period.

The framework of the study is premised on the understanding that single piece ('Other') large letter volumes have been prone to differing levels of electronic substitution (via internet based form completion, the usage of web-based re-directions to online documentation and the growth in email transmissions of electronic documents) over the examined timeframe which has resulted in successive downward shifts in its demand curve.

This research undertaking isolated the impacts of electronic substitution to reveal that the underlying demand for Other large letter volumes is positively associated with fluctuations in the level of domestic economic activity since July 2001.

In the PreSort Barcoded large letter volume segment, the statistical results suggest solid rates of growth in the Australian economy over recent times has primarily driven letter volume growth throughout the 1995/96 to 2007/08 timeframe.

These empirical findings suggest the global and domestic economic slowdown will be a major threat to large letter volume growth in the short term, should the strength of past associations be replicated in future periods.

#### **The Annual Report Effect**

Between 1995/96 to 2007/08 PreSort Barcoded large letter volumes were 22% higher on average in the December Quarter (when compared to the quarterly average) due largely to annual report mailings.

The Corporations Legislation Amendment (Simpler Regulatory System) Act 2007 is expected to reduce PreSort Barcoded large letter volumes as senders move towards electronic alternatives to hardcopy annual reports. Furthermore, the Act only compels companies to mail annual reports to shareholders who nominate to receive them.

Although too early to gauge the full effect of the Act, there is preliminary support to suggest that its introduction has negatively impacted volumes.

Specifically, PreSort Barcoded large letter volumes grew by 0.5% in 2007 yet volumes in the months of September, October and November decreased by 9%, 0.6% & 10.2% respectively when compared to those same months a year prior.

#### **The Impact of Changes in Large Letter Prices**

Although a range of real price variables for large letters represented an important element within the testing process, the variable failed to register any form of statistical significance within the final preferred models.

With two-thirds of the nominal price changes occurring in the first half of the considered timeframe, any associated demand impacts are likely to have been masked by the following overriding impacts:

- i) The high levels of electronic substitution that are assumed to have taken place with respect to the Other large letter volume segment (particularly during the pre-July 2001 period); &
- ii) The solid rates of economic growth experienced within the Australian economy.

Evidence in the United States however, suggests that the aggregated price elasticity of flat mail (the equivalent to total large letters in Australia) rests somewhere between 0.78 and 1.098.

Diversified Specifics will continue to monitor Australian and international price elasticity estimates in future research undertakings.

## Econometric Models<sup>1</sup>

The PreSort Barcoded Large Letter model explains 89.4% of the total quarterly variation in PreSort Barcoded Large Letter volumes over the July 1995 to June 2008 timeframe.

This model has maintained a very high statistical fit combined with a set of robust coefficients to suggest that volumes are driven primarily by fluctuations in: i) Non-farm Real GDP; and ii) The health of the Australian advertising industry.

The Other Large Letter model explains 66.4% of the total quarterly variation in Other Large Letter volumes over the July 2001 to June 2008 timeframe.

In isolating the impacts of electronic substitution, the Other Large Letter product stream was modelled over this truncated timeframe resulting in the level of economic growth representing a statistically significant, yet inelastic, letter volume demand driver.

## Statistically Significant Income Effects

**Income Elasticities<sup>2</sup>:** A 5% increase in Real Non-farm GDP was associated with a:

- 5.1% increase in PreSort Barcoded Large Letter volumes.
- 1.1% increase in Other Large Letter volumes.

**Trend:** Non-farm Real GDP has been growing at an annual average rate of 3.51% over the past seven years and by 3.63% in the year to June 30, 2008.

## Statistically Significant Promotional Effects

**Promotional Elasticity:** A 5% increase in the health of the advertising industry (as measured by Standard and Poor's S&P/ASX 200 Consumer Discretionary Index) was associated with a 1.5% increase in PreSort Barcoded Large Letter volumes.

**Trend:** The Consumer Discretionary Index has fluctuated considerably since the start of 2000. Overall however, the index has increased at an annual average rate of 4.28% over the past seven years. It has decreased by 34.92% in the year to June 30, 2008.

## GDP Projections & Implications for Large Letters

The recent global economic downturn has created an environment of uncertainty surrounding rates of domestic GDP growth. Table KF.1 illustrates that Australian economic growth projections have become significantly more pessimistic in comparison to those published in the middle of 2008.

**Table KF.1: The Changing Perceptions about Australian Economic Growth**

Forecasting Institution	2009 Australian GDP Projections	
	As at July 2008	As at February 2009
Australia and New Zealand Banking Group Limited (ANZ)	2.4%	0.1%
Reserve Bank of Australia (RBA)	2.5%	0.5%
Commonwealth Government Budget Papers	(08/09) 2.75%	(08/09) 1.0%
Commonwealth Bank of Australia (CBA)	3.2%	1.1%
International Monetary Fund (IMF)	3.1%	2.2%

The statistical evidence provided in this research undertaking highlights the importance of economic growth in driving large letter segment volumes. These downward revisions to Australian economic growth therefore imply a more pessimistic outlook for both large letter segments than that previously anticipated.

<sup>1</sup> All elasticities are estimated at their mean and are applicable only to the timeframe over which the econometric models have been developed. In interpreting the elasticities within this study, it is assumed all other factors are held constant.

<sup>2</sup> The reported elasticities are relevant only to the respective timeframes pertaining to each of the econometric models developed.

# 1.0 INTRODUCTION



### 1.1.1 Introduction

Diversified Specifics' econometric<sup>3</sup> analysis of domestic letter volumes at Australia Post may be delineated into the following research undertakings:

**1) A domestic small letter study** - Presented in the document entitled: '*Domestic Small Letter Segment Volume Demand*', which was produced by Diversified Specifics in December 2007; and

**2) A domestic large letter study** - This research undertaking delineates total domestic large letter volumes at Australia Post into its single piece (Other<sup>4</sup>) and bulk (PreSort Barcoded<sup>5</sup>) segments, to reveal a unique set of complexities that underlie the year on year volatility of a letter stream that has largely trended upwards since 1995/96.

Both studies acknowledge that when explaining movements in total letter volumes, it is imperative to recognise today's increasingly dynamic postal landscape (characterised by the effects of electronic substitution, consolidation and rationalisation).

In doing so, this has bought about a need for analysing postal demand characteristics at an individual product stream level, and enables the diversity in letter volume demand characteristics (which were not apparent throughout the 1970's and 1980's) to be captured via individual product specific demand models.

Demand drivers and statistically significant market based demand elasticities<sup>6</sup>, over the 1995/96 to 2007/08 period are identified in this study.

The statistical process employed also detects, highlights, and subsequently isolates, any non-market factors<sup>7</sup> from the analysis, so that the market-based letter volume demand drivers are more readily interpretable.

Diversified Specifics identifies, quantifies and removes these effects, to facilitate an accurate analysis of relevant market-based demand drivers.

It should be noted that the PreSort large letter segment analysis, following the closure of the AdPost product stream, has resulted in combining both transactional and promotional letter mail within the PreSort segment.

This closure has limited Australia Post's ability to discern between these two primary components of bulk lodged volumes.

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<sup>3</sup> Econometric techniques represent the core methodologies applied within this research undertaking. That is, historical mail volume data is related to a number of independent variables with statistical tests determining the preferred explanatory and forecasting equations.

<sup>4</sup> The 'Other large letter' segment consists of full rate mail up to a maximum size, weight and thickness of 360x260mm, 500g, and 20mm respectively. Examples of which is the rectangular and square B4 & C4 envelope sizes.

<sup>5</sup> The 'PreSort Barcoded large letter' segment consists of bulk (300+) lodgements of large letter mail that satisfies the relevant large letter category size and weight requirements.

<sup>6</sup> All elasticities are estimated at their mean and are applicable only to the timeframe over which the econometric models have been developed. In interpreting the elasticities within this study, it is assumed all other factors are held constant.

<sup>7</sup> Such as changes to Australia Post policy that result in product shifting/volume migration or lodgement changes.

## 1.1.2 Major Issues

Importantly, the single piece ('Other') large letter segment has been prone to differing levels of electronic substitution throughout the examined timeframe, which has resulted in successive downward shifts in the demand curve.

Substitutive pressures manifest themselves in the form of movements towards electronic alternatives, such as the proliferation of online document completion and the emergence and growth of electronic report production and transmission (via email). These substitutive practices are however, difficult to measure and quantitatively assess in an empirical study such as this.

Consequently the ensuing analysis undertaken in this research undertaking involved detecting and eliminating downward shifts in the Other large letter volume demand curve, by firstly acknowledging and isolating the impacts of electronic substitution, and subsequently by focusing on quantifying the impacts of the remaining statistical drivers over a more recent timeframe i.e. July 2001 to June 2008.

Indeed over the July 2001 to June 2008 timeframe, it is evident that underlying demand for Other large letter volumes is positively associated with movements in the level of domestic economic activity.

In contrast, this association was significantly crowded out by the electronic substitutive practices in the period pre-July 2001.

Moreover, solid growth in the level of Australian economic activity has primarily driven the substantial growth rates experienced in the PreSort Barcoded large letter volume segment over the 1995/96 to 2007/08 timeframe.

It is for these reasons that the global and domestic economic slowdown represents a major threat to large letter volume growth in the short term, should the strength of past associations be replicated in future periods.

This research undertaking quantifies the hypothesised associations in the form of elasticity estimates via econometric techniques and attempts to provide a scientific foundation for fluctuations in segmented large letter volumes via a thorough statistical exposition.

The analysis adopts a similar methodological approach to that conducted in previous investigations conducted by Diversified Specifics into segmented small letter volume demand, public versions of which were produced in 2002<sup>8</sup> & 2008<sup>9</sup>.

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<sup>8</sup> Diversified Specifics (2002) 'Executive Summary: Small Letter Volume Analysis'.

<sup>9</sup> Diversified Specifics (2007) 'Domestic Small Letter Segment Volume Demand 1995/96 to 2006/07 Public Document', December 2007



### 1.1.3 Objectives

The domestic large letter volumes research objectives pertaining to this project includes:

- The development of a broad set of hypothetical assumptions based upon Australia Post's intuitive beliefs regarding the factors driving volume movements for the Other and PreSort Barcoded product segments;
- To source, collect, cleanse, transform (where required) and integrate the relevant externally available data sources into database form to facilitate the statistical significance testing of the developed hypotheses;
- Utilise the data sets to engage in econometric statistical analysis by developing a series of mathematical models with explanatory and forecasting value;
- To rank the statistically significant letter volume drivers over the July 1995 to June 2008 period and estimate associated (statistically significant) demand elasticities;
- Illustrate, by way of graphical, tabular and numerical descriptive measures, trends in the letter volume data and each of the metric demand drivers;
- Benchmark the growth rates of the hypothesised drivers against those of product segmented domestic large letter volumes utilising a series of charts;
- Place the Australian experience into an international context via a series of global postal comparisons;
- Utilise available knowledge of the environment within which each of the hypothesised large letter volume drivers exist in an to attempt to project forward likely trends and/or any foreseen changes that may have consequences for large letter volume movements;
- Thematically group each of the potential large letter volume drivers examined into broad categories, to generate a more succinct understanding of the issues relevant to each product stream;
- To quantify the levels of seasonality present in each of the domestic large letter volume segments where seasonality proves to be an inherent component of the data;
- To undertake the above research in a manner that facilitates future comparisons in the absence of significant structural changes;
- Generate summary documentation (in the form of internal documentation, a public document and key findings briefs) to be utilised both internally and externally: (i) internally at Australia Post to assist with policy formation and management reports; and (ii) externally by various stakeholders; &
- Assist Australia Post by providing input into the development of large letter volume forecasts.

## 1.2. METHODOLOGY

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### 1.2.1 Preliminaries

The quantitative methodology used in this study reflects that of other econometric demand projects conducted by Diversified Specifics on behalf of Australia Post.

This section therefore outlines Diversified Specifics' standard approach to such analyses as undertaken on behalf of Australia Post.

### 1.2.2 Data sourcing & limitations

Letters Group management at Australia Post conveyed to Diversified Specifics (in this and past projects), the intuitive beliefs underpinning the development of various hypothesised drivers of domestic letter volumes within Australia.

Based upon these discussions and armed with an accumulated knowledge base from previous demand studies, Diversified Specifics subsequently developed a set of hypotheses that would form the basis for its empirical testing.

Letters Group at Australia Post supplied Diversified Specifics with letter volume data in addition to data on some of the independent variables over the 1995/96 to 2007/08 timeframe.

All trends, associations, elasticities and forecasts are therefore estimated on the basis of volume data generated by Australia Post's internal data collection systems, which are beyond the control of Diversified Specifics.

Diversified Specifics sourced various relevant external data to reflect the purported hypotheses prior to the statistical testing and model development process.

Where exact data measurements were unavailable, appropriate proxies were employed as temporary substitutes, until future data updates allow for the inclusion of such variables.

In some instances, data series were transformed or constructed entirely by Diversified Specifics to enable the hypothesis testing.

On occasions, limitations in assessing certain hypotheses were given by insufficient data observations and these cases will continue to be monitored in future domestic letter demand studies/updates.

For a full listing of all variables tested throughout the modelling process, consult Table A1 in [Appendix A](#) of this document.

The developed hypotheses, trends, three year projections and international comparisons relating to each of the hypothesised letter volume drivers are provided in [Section 3](#) of this document.

A comprehensive selection of statistical outputs and further technical analysis pertaining to the research undertaken in this study (in addition to a comprehensive set of benchmarking charts) are presented in the Descriptive and Statistical Analysis document that partners this report.

### 1.2.3 Econometric testing and analysis

Diversified Specifics applied an econometric approach to the letter volume modelling, which implies that historical observations on domestic letter volumes are individually associated with a number of independent variables to produce explanatory and forecasting mathematical equations.

The development of multivariate econometric regression models is an extensive process that involves the fulfilment of various model assumptions and requirements.

In this process, theory is a fundamental guide to variable selection together as a precursor to the statistical significance criteria that determines the preferred equations.

That is, the models must be underpinned by rational associations and be reflective of commonsense outcomes (e.g. all price effects should be negative and income effects positive).

**Appendix B** of this report outlines Diversified Specifics standard statistical decision criteria, however, the fundamental elements of statistical analysis employed include:

- Tabular, graphical and numerical descriptive summaries;
- Linear & Non-linear Ordinary Least Squares estimation techniques;
- Seasonal analysis including: Seasonal factor generation and deseasonalisation of variables;
- Diagnostic checks including: Stability checks of coefficients and goodness of fit assessments for each of the preferred models;
- Common sense assessments;
- Error term analysis; &
- In sample forecasting designed to ensure a robust set of preferred forecasting equations.

2.0 LARGE LETTER SEGMENT VOLUMES



## 2.1. TOTAL LETTER VOLUMES

Total domestic letter volumes at Australia Post are generally defined as comprising the combined total quantity of small and large letters sent from locations within Australia to destinations across Australia.

Since 1995/96 Australia Post's small and large letter volume segments (each of which comprises the aggregate of Other letter volumes and PreSort Barcoded letter volumes) have both trended upwards (See Chart 2.1.1).

Chart 2.1.2 isolates the large letter segment and illustrates an average annual growth rate over the past twelve years of 2.9%, dominated by two sustained periods of continual growth: 1995/1996 to 1999/2000 and 2003/2004 to 2006/2007.

Indeed when three successive years of negative growth were observed (between 2000/2001 to 2002/2003) this period was preceded and succeeded by two significant positive annual growth rates (i.e. 14.19% & 8.27% respectively).

**Chart 2.1.1**

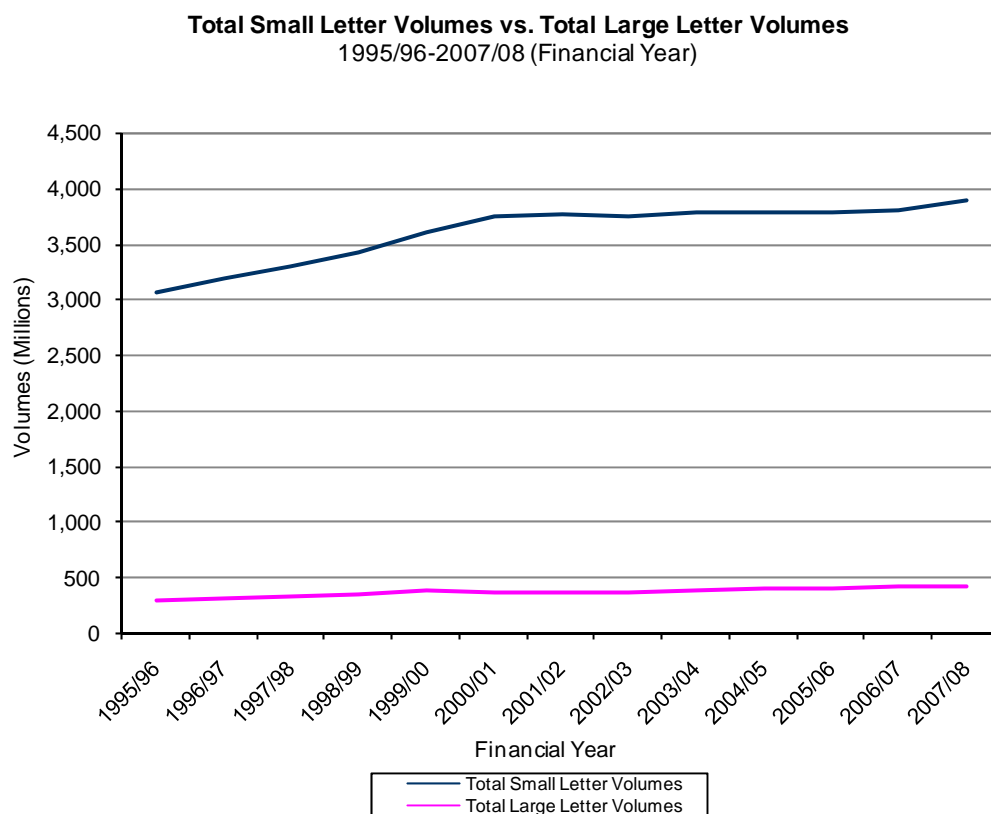


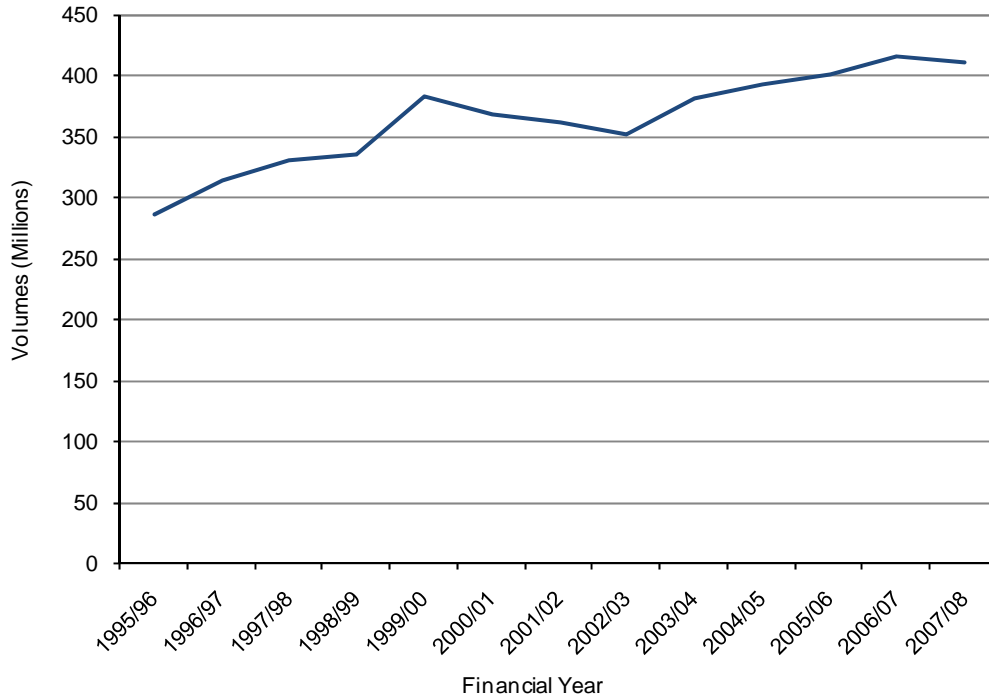
Table 2.1.1 also illustrates annual growth rates that were more volatile for large letter volumes when compared to its smaller counterpart, reiterating the need to model segmented product-specific volumes in developing a superior understanding of certain fluctuations and the exact nature of changing demand drivers.

It should be noted that a marked difference between small and large letters has emerged since the turn of the century.

Specifically, the range of annual growth rates pertaining to total small letter volumes has tightened whilst the annual growth rates of total large letter volumes have tended to remain volatile (See Table 2.1.1).

**Chart 2.1.2**

**Total Large Letter Volumes**  
1995/96-2007/08 (Financial Year)



**Table 2.1.1**

Domestic Letters		
Annual Percentage Changes		
Period	Small Letters %	Large Letters %
1995/96	-	-
1996/97	3.96%	9.66%
1997/98	3.64%	5.33%
1998/99	3.58%	1.45%
1999/00	5.68%	14.19%
2000/01	3.82%	-3.71%
2001/02	0.66%	-1.97%
2002/03	-0.47%	-2.77%
2003/04	0.80%	8.27%
2004/05	0.04%	3.12%
2005/06	0.02%	2.03%
2006/07	0.45%	3.83%
2007/08	2.27%	-1.17%

## 2.2. LARGE LETTER SEGMENT VOLUMES

Over the past twelve years, the vast majority of the stimulus in total large letter volumes has emanated from the PreSort large letter volume segment.

This product stream as a proportion of total large letter volumes has increased by 18 percentage points from 25.71% in 1995/96 to 44.3% in 2007/08.

In sharp contrast Other large letters as a proportion of total large letter volumes has declined from 74.87% in 1995/96 to 55.7% in 2007/08.

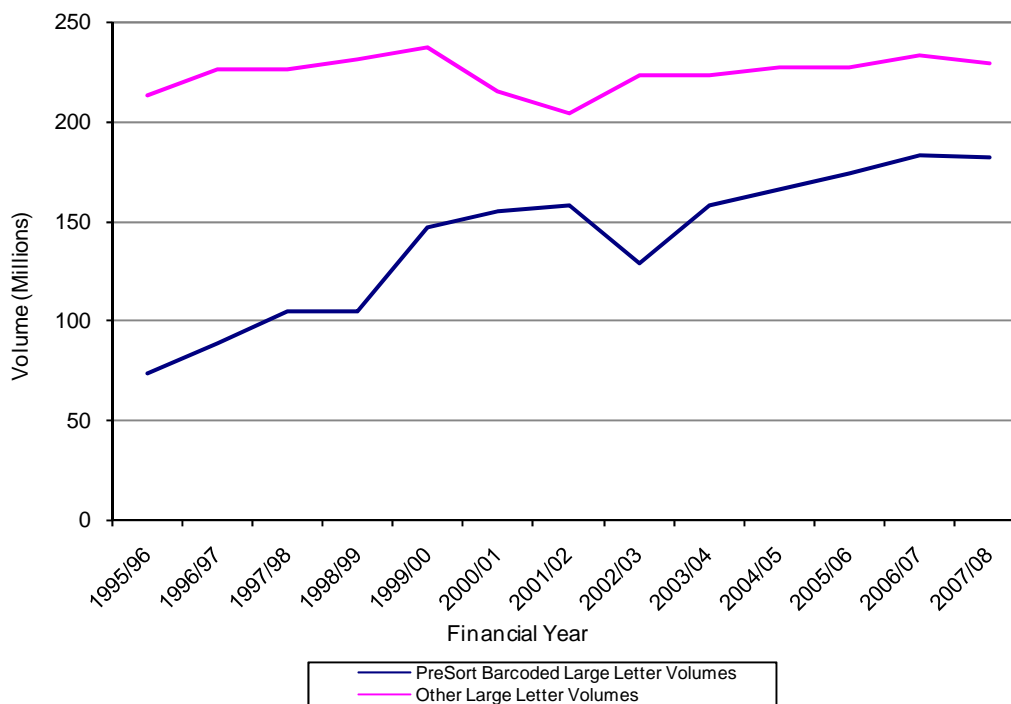
Despite these shifts in the proportionate mix, both product streams have exhibited positive volume trends over the 1995/96-2007/08 timeframe, albeit at significantly different rates of growth.

PreSort Barcoded large letter volumes have grown by an annual average rate of 7.84% since 1995/96 as contrasted to an equivalent figure of 0.61% for Other large letters.

Although Chart 2.2.1 highlights these trends the 2002/03 period highlights volume movements in the opposite direction largely due to the migratory effects generated through the closure of the unbarcoded PreSort service.

**Chart 2.2 1**

**PreSort Barcoded Large Letter Volumes vs. Other Large Letter Volumes**  
1995/96 - 2007/08 (Financial Year)



In recent times PreSort Barcoded large letter volume growth has flattened in comparison to the volatile fluctuations experienced between 1995/1996 and 2003/04 (See Table 2.2.1).

Since 2001/2002 the Other large letter volume segment has oscillated each year above and below zero growth whilst still experiencing a positive average annual growth rate of 1.6% across the past six years.

Throughout the entire period under consideration Australian economic activity has remained solid (See Table 2.2.1) and, as with small letter volumes, fluctuations in Non-farm GDP growth represents an important element in explaining fluctuations in large letter volumes.

**Table 2.2.1**

<b>Year</b>	<b>Other Large Letter Segment Volume Growth</b>	<b>PreSort Barcoded Large Letter Segment Volume Growth</b>	<b>Australian Non-farm GDP Volume Growth</b>
1995/96	-	-	-
1996/97	6.02%	20.18%	3.75%
1997/98	0.17%	18.49%	4.78%
1998/99	2.05%	0.15%	4.91%
1999/00	2.64%	39.54%	4.03%
2000/01	-9.36%	5.41%	1.88%
2001/02	-4.94%	2.17%	3.75%
2002/03	9.38%	-18.47%	4.00%
2003/04	-0.15%	22.87%	3.43%
2004/05	1.93%	4.78%	2.84%
2005/06	-0.02%	4.83%	2.97%
2006/07	2.64%	5.38%	3.92%
2007/08	-1.71%	-0.49%	3.63%



## 2.3. LARGE LETTER SEASONALITY

Quarterly and monthly seasonal factors over the July 1995 to June 2008 timeframe for each of the large letter segments are illustrated in Tables 2.3.1 and 2.3.2 respectively.

The December quarter reflects the peak quarter of activity for both the Other and PreSort Barcoded large letter segments (7% higher compared to the typical quarter for Other large letter volumes; and 22% higher for PreSort Barcoded large letter volumes).

**Table 2.3.1**

Domestic Large letters		
Quarterly Seasonal Factors		
Quarter	Other	PreSort Barcoded
<b>Mar</b>	90.61%	83.96%
<b>Jun</b>	97.84%	92.71%
<b>Sep</b>	104.53%	101.34%
<b>Dec</b>	107.03%	122.00%

October and its surrounding months (i.e. September and November) represent the peak activity months for PreSort Barcoded larger letter volumes; whilst October and November reflect the peak months for Other large letter volumes.

**Table 2.3.2**

Domestic Large letters		
Monthly Seasonal Factors		
Month	Other	PreSort Barcoded
<b>Jan</b>	78.51%	64.21%
<b>Feb</b>	93.43%	83.91%
<b>Mar</b>	99.83%	103.97%
<b>Apr</b>	89.63%	89.14%
<b>May</b>	104.29%	94.18%
<b>Jun</b>	99.53%	94.32%
<b>Jul</b>	103.71%	84.14%
<b>Aug</b>	105.36%	93.91%
<b>Sep</b>	104.52%	125.98%
<b>Oct</b>	109.00%	161.91%
<b>Nov</b>	108.68%	119.89%
<b>Dec</b>	103.51%	84.44%

### Interpretive examples<sup>10</sup>:

- PreSort Barcoded large letter volumes are 22% higher in the December quarter (when compared to the quarterly average) as a result of the annual report effect; &
- Other large letter volumes tend to be significantly lower than the monthly average in January, February and April.

<sup>10</sup> Inferences on seasonality are historical and may only be interpreted as an indicative guide to future seasonal fluctuations.

## The Corporations Legislation Amendment (Simpler Regulatory System) Act 2007

The Corporations Legislation Amendment (Simpler Regulatory System) Act 2007, which received Royal Assent on 28 June 2007, has had a significant negative impact on the volume of company annual reports mailed directly to eligible members.

Specifically, the introduction of the Act now compels companies to only mail annual financial reports to eligible members who state that they would like to receive a hard copy of the report, rather than to all members.

As such, members who do not indicate that they want to receive a hard copy annual report would be unlikely to receive such a report with many companies expected to (or indicating) they will adopt electronic forms of distribution as a result of the change.

Historically, Diversified Specifics has consistently found that volumes of PreSort Barcoded large letter volumes peak in the month of October each year.

Moreover, the months either side of October, have registered the next largest monthly volumes since July 1995.

As presented in Table 2.3.2, PreSort Barcoded large letter volumes were found to be 61.91% higher in the month of October compared to the monthly average level of volumes; 25.98% higher in September; and 19.89% higher in November.

The postulated rationale explaining this peak in volumes is based on the dissemination of company annual reports to eligible members.

Specifically, the bulk of company annual reports are distributed via letter mail to eligible members in the month of October and its surrounding months (September and November).

It stands to reason therefore, that all else being equal, the introduction of the Corporations Legislation Amendment (Simpler Regulatory System) Act 2007 should result in lower volumes of company annual report mailings as it is unlikely that all eligible members will opt-in.

Although the stimulus of periodic annual report letter mailings on PreSort Barcoded large letter volumes is important, such an effect is not explicitly contained within any of the econometric models developed within this research undertaking.

This is due to the seasonal nature of this demand impact, which is incorporated implicitly within the model by virtue of the deasonalisation process.

That is to say that even though the annual report effect is not listed in this report as a statistically significant explainer of fluctuations in PreSort Barcoded large letter volumes, its effect is still quantified via the seasonal factors.

As such, the impact of annual report letter mailings on PreSort Barcoded large letter volumes is implicitly incorporated in any forecasts undertaken with the developed models.

## Preliminary Findings - Impact of the Act

Whilst it is still too early to gauge the full effect, it appears that the introduction of the Corporations Legislation Amendment (Simpler Regulatory System) Act 2007 has negatively impacted PreSort Barcoded large letter volumes.

Specifically, its preliminary impact may well be evident in the negative volume growth rate experienced by this letter segment in 2007/08 (-0.49% as presented in Table 2.2.1).

In addition:

- ◆ Volumes in the month of October 2007 declined by 0.6% compared to the equivalent volumes in October 2006;
- ◆ September 2007 volumes decreased by nearly 9% compared to September 2006 volumes; &
- ◆ Volumes fell by 10.2% in November 2007 when compared to that same month a year earlier.

The statistical analysis suggests whilst the December quarter still reflects peak activity (22% higher than the quarterly average), comparing the actual volumes in December with that of a year ago, PreSort Barcoded large letter volumes themselves declined by 4.3%.

This compares with approximately 4% growth in the June 2007 and September 2007 quarters and 0% growth in the March 2007 quarter.

In addition, when compared to a year earlier, PreSort Barcoded large letter volumes share of calendar year annual volumes has declined from 32.2% in the December quarter 2006 to 30.7% in the December Quarter 2007.

## 3.0 LARGE LETTER HYPOTHESES



The set of explanatory variables investigated in this research undertaking were intended to reflect each of the hypotheses governing suspected associations with movements in Other and PreSort Barcoded large letter volumes.

Tables 3.1.1 & 3.1.2 highlights each of the variables assessed broadly categorised into relevant thematic groups:

**Table 3.1.1**

**List of Examined Explanatory Variables**

<b>Other Large Letter Volume Segment</b>	
<b>Macroeconomic</b>	o Australian Non-farm GDP
	o Advertising Industry Health Measure
	o Communications Industry Economic Activity
	o Finance and Insurance Industry Economic Activity
	o Government Administration and Defence Industry Economic Activity
	o Property & Business Services Industry Economic Activity
	o Retail Trade Industry Economic Activity
	o Personal and Other Services Industry Economic Activity
	o Cultural and Recreational Services Industry Economic Activity
	o Wholesale Trade Industry Economic Activity
	o Health and Community Services Industry Economic Activity
	o Education Industry Economic Activity
	<b>Product</b>
o Real Price of Other Large Letters	
o Introduction of Barcoding Technology	
o Closure of the Unbarcoded PreSort Service	
<b>Competition</b>	o Substitution Measurement (Sep 2000 to Sep 2001)
	o Substitution Measurement (Dec 2001 to Dec 2007)
<b>Demographic</b>	o Estimated Australian Population

Presented in this section, are the hypothesised associations between each variable assessed and each large letter volume segment aimed at explicitly outlining the intuitive beliefs regarding the nature and direction of the alleged association.

These hypotheses were formed based on discussions with Australia Post management in addition to the accumulated knowledge base obtained by Diversified Specifics from previous demand studies.

It is these hypotheses that form the basis for the conducted empirical tests.

An analysis of underlying trends is also conducted in this section together with international comparisons where available. Future projections on each of the variables of interest (where possible) are also presented.

Within the analysis the generalised macroeconomic measure of economic activity i.e. Australian Non-farm Gross Domestic Product (GDP), was disaggregated to facilitate the investigation of associations at an industry level.

National PreSort Non-promotional and Promotional large letter charge account volumes based on 2003 data, were used to select the specific industries that were ultimately assessed.<sup>11</sup>

<sup>11</sup> 2003 Charge Account source data supplied by Letters Group, Australia Post. A year contained within the timeframe such as 2003 was chosen to avoid the analysis of a group of industry segments that might have become redundant if the first or last year in the timeframe had been selected instead.

It is implicitly assumed that industry shares did not significantly alter in preceding and subsequent times, thereby ensuring relevant industries were not omitted in the overall analytical process.

Each variable is assessed on the basis of data availability and any notable data issues that may affect the integrity of the statistical model development process are duly recorded.

**Table 3.1 2**

**List of Examined Explanatory Variables**

<b>PreSort Barcoded Large Letter Volume Segment</b>	
<b>Macroeconomic</b>	<ul style="list-style-type: none"> <li>o Australian Non-farm GDP;</li> <li>o Advertising Industry Health Measure;</li> <li>o Communications Industry Economic Activity;</li> <li>o Finance and Insurance Industry Economic Activity;</li> <li>o Government Administration and Defence Industry Economic Activity;</li> <li>o Property &amp; Business Services Industry Economic Activity;</li> <li>o Retail Trade Industry Economic Activity;</li> <li>o Manufacturing Industry Economic Activity;</li> </ul>
<b>Product</b>	<ul style="list-style-type: none"> <li>o Large Letter Delivery Performance;</li> <li>o Real Price of PreSort Barcoded Large Letters;</li> <li>o Introduction of Barcoding Technology;</li> <li>o Closure of the Unbarcoded PreSort Service;</li> </ul>
<b>Input Costs</b>	<ul style="list-style-type: none"> <li>o Paper as an Input Cost (1) Paper Stationery;</li> <li>o Paper as an Input Cost (2): Printing &amp; Services to Print;</li> </ul>
<b>Demographic</b>	<ul style="list-style-type: none"> <li>o Estimated Australian Population;</li> </ul>
<b>Ad Hoc Events</b>	<ul style="list-style-type: none"> <li>o Political Events; &amp;</li> <li>o Major Events.</li> </ul>

### 3.2. HYPOTHESES

Letters Group management at Australia Post conveyed to Diversified Specifics (in this and past projects), the intuitive beliefs underpinning the development of various hypothesised drivers of domestic Other and PreSort Barcoded large letter volumes within Australia. These hypotheses are tabulated in Tables 3.2.1 and 3.2.2.

**Table 3.2.1**

<b>Other Large Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Australian Non-farm GDP</b>	Positive
<i>Rationale:</i> Other large letter volumes are stimulated by economic activity and hence fluctuate in accordance with changing economic conditions.	
<b>Advertising Industry Health Measure</b>	Positive
<b>Communications Industry Economic Activity</b>	Positive
<b>Finance and Insurance Industry Economic Activity</b>	Positive
<b>Government Administration and Defence Industry Economic Activity</b>	Positive
<b>Property &amp; Business Services Industry Economic Activity</b>	Positive
<b>Retail Trade Industry Economic Activity</b>	Positive
<b>Personal and Other Services Industry Economic Activity</b>	Positive
<b>Cultural and Recreational Services Industry Economic Activity</b>	Positive
<b>Wholesale Trade Industry Economic Activity</b>	Positive
<b>Health and Community Services Industry Economic Activity</b>	Positive
<b>Education Industry Economic Activity</b>	Positive
<i>Rationale:</i> Movements in economic activity within different industry segments that send single piece items are individually associated with fluctuations in Other large letter volumes in a similar manner to aggregated economic activity measures.	
<b>Large Letter Delivery Performance</b>	Positive
<i>Rationale:</i> Perceived unacceptable delays in the delivery of Other large letters are assumed to have a dampening impact on Other large letter volumes as senders seek alternative means, where possible, to the regular mail service. Higher levels of delivery performance enhance perceived reliability and are expected to be associated with higher demand for Other large letter volumes.	
<b>Real Price of Other Large Letters</b>	Negative
<i>Rationale:</i> In accordance with the standard principles of demand theory, fluctuations in Other large letter volumes are inversely associated with movements in own price. Specifically, increases in the real price of Other large letter volumes are expected to result in lower demand for Other large letter volumes; whilst a stimulatory effect is assumed for decreases in the real price.	
<b>Introduction of Barcoding Technology / Reduction to 300</b>	Negative
<i>Rationale:</i> The introduction of barcoding technology near the turn of the century has had a negative impact on Other large letter volumes. Specifically, previous senders of significant quantities of Other large letters would be financially incentivised to send such mail as sorted bulk letters. Economic rationale therefore suggests a resultant migratory effect away from the Other large letter product stream to the PreSort large letter product stream.	
<b>Closure of the Unbarcoded PreSort Service</b>	Positive
<i>Rationale:</i> The exclusion of unbarcoded letters from the PreSort large letter product stream resulted in a shift in demand from PreSort large letters to the Other large letter product segment.	
<b>Substitution Measurement (Sep 2000 to Sep 2001)</b>	Negative
<b>Substitution Measurement (Dec 2001 to Dec 2007)</b>	Negative
<i>Rationale:</i> Senders have engaged in increasing levels of substitutive activity, decreasing Other large letter volumes through the increased usage of documentation sent via email, website postings of downloadable documents and the emergence of online form completion. Moreover, it is asserted that the growth of such substitutive practices progressively shifted the Other large letter volume demand curve downwards throughout the examinable timeframe.	
<b>Estimated Australian Population</b>	Positive
<i>Rationale:</i> Positive population growth has increased the base number of potential mail recipients and represents a natural stimulus in the demand for Other large letter volumes.	

Table 3.2.2

<b>PreSort Barcoded Large Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Australian Non-farm GDP</b>	Positive
<i>Rationale:</i> Both the transactional and promotional components of PreSort large letter volumes are associated with fluctuations in economic activity as bulk mailings alter in line with changes in the economic climate.	
<b>Advertising Industry Health Measure</b>	Positive
<b>Communications Industry Economic Activity</b>	Positive
<b>Finance and Insurance Industry Economic Activity</b>	Positive
<b>Government Administration and Defence Industry Economic Activity</b>	Positive
<b>Property &amp; Business Services Industry Economic Activity</b>	Positive
<b>Retail Trade Industry Economic Activity</b>	Positive
<b>Manufacturing Industry Economic Activity</b>	Positive
<i>Rationale:</i> Movements in economic activity within different industry segments are individually associated with fluctuations in PreSort Barcoded large letter volumes as the prosperity of companies comprising certain sectors of the economy tends to drive bulk mailings within particular industries.	
<b>Large Letter Delivery Performance</b>	Positive
<i>Rationale:</i> Lower levels of delivery performance is associated with lower demand for PreSort Barcoded large letter volumes, as senders may seek alternatives to sending a mail item via this product stream. Conversely, higher levels of delivery performance are associated with higher levels of demand as they act to consolidate confidence in the reliability of the service.	
<b>Real Price of PreSort Barcoded Large Letters</b>	Negative
<i>Rationale:</i> The real price (i.e. price adjusted for the general cost of living) of PreSort Barcoded large letters is hypothesised to be inversely associated with PreSort Barcoded large letter volumes as per standard demand theory governing price effects. Theoretically, increases in the real cost of sending PreSort Barcoded large letters are expected to result in reduced volume demand.	
<b>Introduction of Barcoding Technology / Reduction to 300</b>	Positive
<i>Rationale:</i> The introduction of barcoding technology resulted in an upward structural shift in demand for PreSort Barcoded large letter volumes. As previously noted, following the introduction of barcoding technology, senders of significant quantities of Other large letters were financially incentivised to send such mail as sorted bulk letters which resulted in a migratory effect away from the Other large letter product stream to the PreSort large letter counterpart.	
<b>Closure of the Unbarcoded PreSort Service</b>	Negative
<i>Rationale:</i> The abolishment of the Unbarcoded PreSort service in July 2002 eliminated PreSort pricing discounts for Unbarcoded large letters. Demand for PreSort Barcoded large letter volume then declined as senders reverted to the mailing of Unbarcoded large letters via the Other large letter mail stream.	
<b>Paper as an Input Cost (1) Paper Stationery</b>	Negative
<i>Rationale:</i> Movements in the cost of paper stationery are hypothesised to be negatively associated with PreSort Barcoded large letter volumes. Paper costs represent a sizable portion of the total cost of compiling documents that will ultimately be sent via the PreSort Barcoded large letter channel.	
<b>Paper as an Input Cost (2): Printing &amp; Services to Print</b>	Negative
<i>Rationale:</i> As with paper stationery, fluctuations in printing costs represent a sizable portion of the total cost of producing a document that may be sent via the PreSort Barcoded large letter volume stream.	
<b>Estimated Australian Population</b>	Positive
<i>Rationale:</i> A higher population (and associated increased number of households) is likely to result in natural increases in both promotional and transactional PreSort Barcoded large letter volumes.	
<b>Political Events</b>	Positive
<i>Rationale:</i> The occurrence of political events are hypothesised to stimulate PreSort Barcoded large letter volumes as a result of political parties engaging in bulk promotional letter sending to support their political campaigns.	
<b>Major Events</b>	Negative
<i>Rationale:</i> Extraneous events (disturbances) may divert normal business activities. Specifically, events such as the Sydney 2000 Olympic Games, the U.S. terrorist attacks (September 2001) and SARS in 2003 resulted in distracting the attention of the general public reducing demand for PreSort Barcoded large letters.	



### 3.3 DATA TRENDS AND ISSUES

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#### 3.3.1 COMPILING THE DATA

Diversified Specifics sourced a variety of relevant external data sets aimed at reflecting each of the hypotheses outlined in the previous section.

Where exact data measurements were unavailable, appropriate proxies have been employed as temporary substitutes, until future data updates allow for the inclusion of such variables.

In some instances, data series were transformed or constructed entirely by Diversified Specifics to enable the hypothesis testing.

On occasions, limitations in assessing certain hypotheses were given by insufficient data observations and these cases will continue to be monitored in future domestic letter demand studies/updates.

A complete listing of all variables, timeframes and data sources utilised in this research undertaking are contained in Appendix A (Table A.1) of this research document.

### 3.3.2 DATA TRENDS

#### 3.3.2.1 Numerical Descriptive Trend Summary

Table 3.3.2.1 provides a numerical summary of the growth rates for the large letter volume segments and the hypothesised explanatory variables:

**Table 3.3.2.1**

Annual Percentage Growth Rates Related to the Other Large Letter Volume Study													
Variables Utilised in the Other Large Letter Volume Study*	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
<b>Other Large Letter Volumes</b>	-	<b>6.02%</b>	<b>0.17%</b>	<b>2.05%</b>	<b>2.64%</b>	<b>-9.36%</b>	<b>-4.94%</b>	<b>9.38%</b>	<b>-0.15%</b>	<b>1.93%</b>	<b>-0.02%</b>	<b>2.64%</b>	<b>-1.71%</b>
Australian Non-farm GDP	3.65%	3.75%	4.78%	4.91%	4.03%	1.88%	3.75%	4.00%	3.43%	2.84%	2.97%	3.92%	3.63%
Advertising Industry Health Measure	-	<b>-7.33%</b>	54.32%	25.89%	45.31%	<b>-18.02%</b>	<b>-24.69%</b>	<b>-11.74%</b>	24.62%	1.34%	7.63%	25.26%	<b>-34.92%</b>
Communications Industry	10.02%	10.27%	10.63%	10.71%	5.42%	0.50%	3.21%	8.47%	4.73%	3.48%	7.28%	10.36%	7.26%
Finance and Insurance Industry	4.27%	1.77%	4.28%	9.57%	6.53%	1.08%	3.40%	2.14%	5.28%	4.27%	5.00%	8.76%	4.68%
Government Administration and Defence Industry	0.29%	3.89%	<b>-0.78%</b>	5.10%	1.92%	2.47%	3.88%	<b>-0.90%</b>	1.46%	3.54%	2.62%	4.06%	0.63%
Property & Business Services Industry	3.22%	6.69%	6.66%	8.61%	6.13%	6.42%	5.37%	3.26%	3.63%	0.92%	3.16%	2.86%	5.42%
Retail Trade Industry	4.28%	5.04%	3.34%	5.33%	4.18%	2.03%	5.17%	4.65%	5.17%	4.21%	1.04%	3.96%	4.32%
Personal and Other Services Industry	4.87%	3.48%	4.56%	4.29%	3.06%	5.72%	4.53%	1.58%	1.52%	1.61%	3.53%	4.88%	8.45%
Cultural and Recreational Services	0.30%	1.62%	5.55%	3.57%	3.63%	5.21%	1.29%	3.39%	6.50%	5.32%	2.74%	6.38%	3.12%
Wholesale Trade Industry	6.83%	5.21%	5.95%	3.71%	4.90%	<b>-0.51%</b>	3.15%	4.26%	4.85%	3.51%	2.95%	1.98%	2.81%
Health and Community Services Industry	5.66%	2.77%	3.23%	2.66%	4.97%	4.81%	5.61%	3.94%	4.39%	4.03%	4.72%	2.46%	5.04%
Education Industry	2.07%	3.51%	2.28%	3.33%	1.09%	1.64%	1.78%	1.59%	1.11%	1.21%	1.24%	1.50%	1.60%
Large Letter Delivery Performance	-	-	-	<b>-3.34%</b>	<b>-1.90%</b>	5.69%	1.51%	1.38%	<b>-3.14%</b>	<b>-2.70%</b>	2.22%	3.15%	-
Real Price of Other Large Letters	-	<b>-0.59%</b>	<b>-0.58%</b>	0.00%	8.73%	5.01%	<b>-1.70%</b>	<b>-2.45%</b>	<b>-2.81%</b>	<b>-3.29%</b>	<b>-3.34%</b>	<b>-3.08%</b>	<b>-5.12%</b>
Estimated Australian Population	-	1.13%	1.05%	1.15%	1.20%	1.36%	1.23%	1.24%	1.17%	1.33%	1.49%	1.53%	1.13%

\* Indicates due to the dichotomous nature of the following variables the calculation of annual growth rates is not possible: i) Introduction of Barcoding Technology; ii) Closure of the Unbarcoded PreSort Service; iii) Substitution Measurement (September 2000 to September 2001); & iv) Substitution Measurement (December 2001 to June 2008).

A complete set of charts benchmarking each of the above explanatory variables against Other large letter volume fluctuations is provided in the Descriptive and Statistical Analysis document that partners this report.

Table 3.3.2.2 provides a comprehensive numerical summary of the growth rates for the PreSort Barcoded large letter volume segments and the hypothesised explanatory variables:

**Table 3.3.2.2**

Annual Percentage Growth Rates Related to the PreSort Barcoded Large Letter Volume Study													
Variables Utilised in the PreSort Barcoded Large Letter Study	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08
<b>PreSort Barcoded Large Letter Volumes</b>	-	<b>20.18%</b>	<b>18.49%</b>	<b>0.15%</b>	<b>39.54%</b>	<b>5.41%</b>	<b>2.17%</b>	<b>-18.47%</b>	<b>22.87%</b>	<b>4.78%</b>	<b>4.83%</b>	<b>5.38%</b>	<b>-0.49%</b>
Australian Non-farm GDP	3.65%	3.75%	4.78%	4.91%	4.03%	1.88%	3.75%	4.00%	3.43%	2.84%	2.97%	3.92%	3.63%
Advertising Industry Health Measure	-	<b>-7.33%</b>	54.32%	25.89%	45.31%	<b>-18.02%</b>	<b>-24.69%</b>	<b>-11.74%</b>	24.62%	1.34%	7.63%	25.26%	<b>-34.92%</b>
Communications Industry	10.02%	10.27%	10.63%	10.71%	5.42%	0.50%	3.21%	8.47%	4.73%	3.48%	7.28%	10.36%	7.26%
Finance and Insurance Industry	4.27%	1.77%	4.28%	9.57%	6.53%	1.08%	3.40%	2.14%	5.28%	4.27%	5.00%	8.76%	4.68%
Government Administration and Defence Industry	0.29%	3.89%	<b>-0.78%</b>	5.10%	1.92%	2.47%	3.88%	<b>-0.90%</b>	1.46%	3.54%	2.62%	4.06%	0.63%
Property & Business Services Industry	3.22%	6.69%	6.66%	8.61%	6.13%	6.42%	5.37%	3.26%	3.63%	0.92%	3.16%	2.86%	5.42%
Retail Trade Industry	4.28%	5.04%	3.34%	5.33%	4.18%	2.03%	5.17%	4.65%	5.17%	4.21%	1.04%	3.96%	4.32%
Manufacturing Industry	1.65%	2.04%	3.04%	2.05%	0.94%	2.22%	2.09%	3.67%	0.88%	-0.97%	-0.79%	1.99%	3.55%
Large Letter Delivery Performance	-	-	-	<b>-3.34%</b>	<b>-1.90%</b>	5.69%	1.51%	1.38%	<b>-3.14%</b>	<b>-2.70%</b>	2.22%	3.15%	-
Real Price of PreSort Barcoded Large Letters	-	<b>-5.62%</b>	<b>-2.31%</b>	3.73%	2.74%	<b>-2.67%</b>	2.06%	<b>-0.11%</b>	<b>-5.36%</b>	<b>-4.57%</b>	<b>-6.16%</b>	<b>-5.17%</b>	<b>-6.04%</b>
Paper as an Input Cost (1) Paper Stationery	-	<b>-2.43%</b>	3.04%	<b>-0.09%</b>	10.13%	0.24%	0.32%	<b>-2.83%</b>	1.42%	<b>-1.64%</b>	1.59%	0.49%	<b>-2.43%</b>
Paper as an Input Cost (2) Printing & Service to Print	-	<b>-1.02%</b>	0.09%	<b>-1.68%</b>	<b>-0.76%</b>	3.15%	<b>-1.02%</b>	<b>-5.43%</b>	<b>-3.07%</b>	<b>-0.20%</b>	1.84%	<b>-2.81%</b>	1.45%
Estimated Australian Population	-	1.13%	1.05%	1.15%	1.20%	1.36%	1.23%	1.24%	1.17%	1.33%	1.49%	1.53%	1.13%

\* Indicates due to the dichotomous nature of the following variables the calculation of annual growth rates is not possible: i) Introduction of Barcoding Technology; ii) Closure of the Unbarcoded PreSort Service; iii) Political Events; & iv) Major Events.

A complete set of charts benchmarking each of the above explanatory variables against PreSort Barcoded large letter volume fluctuations is provided in the Descriptive and Statistical Analysis document that partners this report.

### 3.3.2.2 Industry Segmented GDP Trends

The nature of the association between the large letter volume segments and Non-farm Real GDP has altered significantly when contrasting the late nineties with the period following the turn of the century.

In an attempt to isolate any industry specific associations Diversified Specifics interrogated the Australian Bureau of Statistics (ABS) Gross Domestic Product (GDP) industry sub-segments. The results of which, are summarised in this section.

The selection of the industries to be analysed at each large letter product segment was based on market share industry data supplied to Diversified Specifics by Australia Post.<sup>12</sup>

#### Other Large Letters

The contention is that the first phase of Other large letter substitution began to shift the Other large letter volume demand curve downwards prior to the year 2000 and therefore the association with economic activity was eroded substantially.

In the post 2000 period the major losses from this first phase of electronic substitution appeared to already have occurred and whilst there might be some continuing threat to volumes presented by electronic mediums, the initial trend in mass movements away from the traditional single piece large letter appeared to have lessened.

This is reflected in the changes to the bilateral association that exists between Other large letters and Non-farm Real GDP when contrasting the two periods.

Indeed, the strength of this association in the 1995/96-2000/01 period was 29.3% contrasted to the 68.6% correlation that describes the 2001/02-2007/08 period.

Segmenting Real GDP into its industry based sub-segments (See Table 3.3.2.3) emphasises this trend and presents a compelling case for utilising economic growth based explanations of the latter period, rather than substitutive effects, when projecting Other large letter volumes forward via the use of econometric modelling techniques.

**Table 3.3.2.3**

<b>Bi-lateral Correlations<sup>13</sup></b>		
<b>Industry Activity against Other Large Letters</b>		
	<b>Jul 95 - Jun 01</b>	<b>Jul 01 - Jun 08</b>
Advertising Industry <sup>14</sup>	15%	29%
Communication Industry	37%	66%
Finance and Insurance Industry	24%	63%
Government Administration and Defence Industry	24%	59%
Property & Business Services Industry	23%	64%
Retail Trade Industry	28%	70%
Personal and Other Services Industry	17%	55%
Cultural and Recreational Services Industry	20%	68%
Wholesale Trade Industry	38%	71%
Health and Community Services Industry	17%	67%
Education Industry	32%	67%

<sup>12</sup> Market share data based on charge account data supplied to Diversified Specifics as at 2003.

<sup>13</sup> All bivariate correlations outlined in this section are generated based upon seasonally adjusted and natural logarithmic transformed variables consistent with the approach utilised in the econometric modelling.

<sup>14</sup> Variables in Table 3.3.2.3 are all GDP segments apart from the variable utilised for the Advertising Industry, which is prepared by Diversified Specific and emanates from the S&P/ASX 200 Consumer Discretionary Index, Standard and Poor's, <http://www.standardandpoors.com/>

## PreSort Barcoded Large Letters

The inter-temporal strength of association also alters when conducting a similar analysis over the two timeframes on PreSort Barcoded large letter volumes at industry economic activity level.

In contrast to the previous case however, there is compelling evidence to suggest retention of Non-farm GDP as a key driver of volumes over the entire timeframe.

The strength of this association between PreSort Barcoded large letter volume fluctuations and Non-farm GDP in the 1995/96-2000/01 period was 92.2% contrasted to the 71.0% correlation that describes the 2001/02-2007/08 period.

At an industry level, Table 3.3.2.4 illustrates noticeably stronger bi-lateral correlations between PreSort Barcoded large letters and each of the individual GDP segments over the July 1995 to June 2001 timeframe than was the case for Other large letter volumes.

This is consistent with the argument that the single piece letter item tends to be more prone to substitutive pressures than bulk offerings, which are more likely to be driven by the prosperity of firms as given by measures such as GDP.<sup>15</sup>

**Table 3.3.2.4**

<b>Bi-lateral Correlations<sup>16</sup></b>		
<b>Industry Activity against PreSort Barcoded Large Letters</b>		
	<b>Jul 95 - Jun 01</b>	<b>Jul 01 - Jun 08</b>
Advertising Industry <sup>17</sup>	86%	84%
Communications Industry	89%	68%
Finance and Insurance Industry	90%	76%
Government Administration and Defence Industry	88%	81%
Property & Business Services Industry	92%	68%
Retail Trade Industry	92%	71%

<sup>15</sup> Diversified Specifics (2007) 'Domestic Small Letter Segment Volume Demand 1995/96 to 2006/07 Public Document', December 2007, p.51

<sup>16</sup> All bivariate correlations outlined in this section are generated based upon seasonally adjusted and natural logarithmic transformed variables consistent with the approach utilised in the econometric modelling.

<sup>17</sup> Variables in Table 3.3.2.4 are all GDP segments apart from the variable utilised for the Advertising Industry, which is prepared by Diversified Specific and emanates from the S&P/ASX 200 Consumer Discretionary Index, Standard and Poor's, <http://www.standardandpoors.com/>

### 3.3.3 DATA ISSUES

Significant data issues represent those matters having the potential to impact the current research undertaking and in many cases, require monitoring for future updates.

Diversified Specifics has documented such issues and each may be summarised as follows:

#### **Delivery Service Performance**

An assessment of the impact of delivery performance changes on Other large letter volumes would be significantly enhanced if sender expectations regarding the timeliness of delivery were known and pitted against actual delivery performance data.

As with small letters, limited variability in Australia Posts delivery service performance measure over the examinable timeframe has given rise to a relatively flat trend line.

Although, from an operational viewpoint, consistency in service quality is preferred, from an empirical modelling viewpoint, this lack of variation results in a hypothesis that is extremely difficult to test with the existing time series data.

#### **Real Price**

During the testing of the price variable for the large letter investigation, the Average Revenue Factor approach to specifying nominal price movements was replaced. Specifically, it was replaced by utilising a chronology of actual price changes (prior to variable deflation) to develop a superior and more accurate price measure.

Although there does exist a number of price points the fact that the bulk of volumes tend to reside within a single price point category suggested that weightings according to the different price points would have provided only marginal benefits.

This combined with the difficulties in accurately specifying these volumes led to the development of a single un-weighted price index for this variable.

#### **The Health of the Advertising Industry Index**

The S&P/ASX 200 Consumer Discretionary Index reflects investment in Australian stocks related to industries that are vulnerable to changes in broad economic conditions, including investment in the media industry.

The Index therefore, reflects (among other things) general economic conditions in the media industry.

Prior to the use of the S&P/ASX 200 Consumer Discretionary Index, a more direct measure known as the 'Media Index'<sup>18</sup> was employed.

The Media Index was discontinued in April 2002 and replaced by the S&P/ASX 200 Consumer Discretionary Index, which is a broader measure than its predecessor.

A positive correlation of near one (i.e. almost perfect correlation) was evident for the data period in which both indexes co-existed.

As such, it was deemed that in order to not lose data prior to April 2002, the Media Index data was extrapolated using growth in the S&P/ASX 200 Consumer Discretionary Index.

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<sup>18</sup> InvestorWeb, <http://www.investorweb.com.au>

### 3 . 3 . 4 P R O J E C T I O N S

The strength of the associations detected in this research undertaking are measured by the elasticities generated via econometric techniques.

The elasticities found to be statistical significant are reported in Section 4 of this report.

Of equal importance are the projected values of those variables hypothesised to possess an association with the large letter volume segments.

Where such projections are credibly based upon best available evidence, they may provide insight into future fluctuations in the large letter volume segments (holding all other factors constant).

Importantly, the accuracy of the projections are dependent on the extent to which future associations replicate the associations previously ascertained.

### 3.3.4.1 Australian Non-Farm GDP

Recent events in global financial markets (the so called 'Credit Crunch') have created an environment of uncertainty surrounding rates of domestic GDP growth.

Table 3.3.4.1 illustrates global and domestic economic growth projections heading into 2009 are significantly more pessimistic in comparison to those compiled in the middle of the preceding year.

**Table 3.3.4.1  
The Changing Perceptions about Australian Economic Growth**

Institution	2009 GDP Projections	
	As at July 2008	As at February 2009
Australia and New Zealand Banking Group Limited (ANZ)	2.4%	0.1%
Reserve Bank of Australia (RBA)	2.5%	0.5%
Commonwealth Government Budget Papers	(08/09) 2.75%	(08/09) 1.0%
Commonwealth Bank of Australia (CBA)	3.2%	1.1%
International Monetary Fund (IMF)	3.1%	2.2%

Although all of the projections in Table 3.3.4.1 relate to Total GDP, the February release of the Reserve Bank of Australia's (RBA) Statement on Monetary Policy contained a revised forecast of Non-farm economic activity for 2009, which fell from an initial forecast months earlier of 1.75% to 0.25%.<sup>19</sup>

Indeed in 2008 and in response to this declining trend in economic growth projections, when the RBA officially reduced interest rates by 25 basis points to 7 percent, this represented the first interest rate reduction since December 2001.<sup>20</sup>

In 2008 the Australia and New Zealand Banking Group Limited (ANZ) first commented on the pessimistic outlook underpinning the RBA's forecast of Non-farm GDP for 2008 as appearing to be too low given growth at 1.2% for the first two quarters of 2008.<sup>21</sup>

The rapid onset of the global economic meltdown is however reflected in the February 2, 2009, GDP growth forecasts from ANZ which has been revised to 0.1% in 2009 and 2.0% in 2010.<sup>22</sup>

These forecasts have altered quite considerably from the ANZ's GDP projections generated in the preceding quarters.

Government Budget Papers released in May 2008 contained forecasts in real economic growth of 2.75% in 2008/09; and 3% per annum in the subsequent three financial years i.e. 2009/10, 2010/11 and 2011/12.<sup>23</sup>

In the latest Updated Economic and Fiscal Outlook, the Commonwealth government has also revised these figures downwards to 1.0% in 2008/09 and 0.5% in 2009/10.<sup>24</sup>

The Commonwealth Bank of Australia's (CBA) forecasts of domestic economic growth were progressively revised downwards throughout 2008 with a forecast of 3.2% for the year 2009 issued as late as July.<sup>25</sup>

<sup>19</sup> RBA, STATEMENT ON MONETARY POLICY – February 2009, [http://www.rba.gov.au/PublicationsAndResearch/StatementsOnMonetaryPolicy/Statements/statement\\_on\\_monetary\\_0209.pdf](http://www.rba.gov.au/PublicationsAndResearch/StatementsOnMonetaryPolicy/Statements/statement_on_monetary_0209.pdf)

<sup>20</sup> News Digital Media (2008) 'RBA, big banks cut interest rates', 2<sup>nd</sup> September 2008, <http://www.news.com.au/business/money/story/0,25479,24281681-5016110,00.html>.

<sup>21</sup> ANZ Australian Economics Weekly (2008) , 5 September 2008, <http://www.anz.com/documents/economics/eco%20weekly080905.pdf>

<sup>22</sup> ANZ Economic Outlook (2009), March quarter 2009 , <http://www.anz.com/documents/economics/AEO%20Mar%2009.pdf>

<sup>23</sup> Commonwealth Budget Paper (2008) 'Budget at a glance' [http://www.budget.gov.au/2008-09/content/overview/html/overview\\_01.htm](http://www.budget.gov.au/2008-09/content/overview/html/overview_01.htm)

<sup>24</sup> Updated Economic and Fiscal Outlook (2009), Part 3: Economic outlook, February 2009, [http://www.budget.gov.au/2008-09/content/uefo/download/UEFO\\_03\\_Part\\_3.pdf](http://www.budget.gov.au/2008-09/content/uefo/download/UEFO_03_Part_3.pdf)

<sup>25</sup> Commonwealth Research (2008), Commonwealth Bank of Australia, July 4, 2008, [http://www.research.commbank.com.au/CBA\\_Research\\_Common\\_Functions/Display\\_Pdf/0,2226,25448,00.pdf](http://www.research.commbank.com.au/CBA_Research_Common_Functions/Display_Pdf/0,2226,25448,00.pdf)



By the end of January 2009 the equivalent CBA forecast too changed dramatically (1.1% in 2009) attributable to the impact of the recent global economic crisis.

The CBA do however project a more positive outlook for the Australian economy beyond 2009 with its 2010 growth projections at 2.7%<sup>26</sup>.

The prosperity of the Australian economy, as perceived by an international body such as the International Monetary Fund (IMF) is far more optimistic than that anticipated by domestic institutions over the shorter term.

Economic growth as published in the World Economic Outlook (April 2008) showed the IMF projections of Australian economic growth at 3.1% in 2009<sup>27</sup> with the latest October 2008 update reporting a reduced figure of 2.2%<sup>28</sup> for that same year.

**In summary, given the volatile nature of the domestic and global economy, economic growth projections have been continually revised downwards over the past year.**

Given the importance of this variable in driving various letter segment volumes (See Section 4 of this report) it is recommended that extreme caution is applied to any attempts to forecast letter volumes with such models until increased certainty is restored.

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<sup>26</sup> Updated Economic and Fiscal Outlook (2009), Part 3: Economic Outlook, February 2009, [http://www.budget.gov.au/2008-09/content/uefo/download/UEFO\\_03\\_Part\\_3.pdf](http://www.budget.gov.au/2008-09/content/uefo/download/UEFO_03_Part_3.pdf)

<sup>27</sup> International Monetary Fund (2009) 'Australia and IMF', <http://www.imf.org/external/country/AUS/index.htm>

<sup>28</sup> IMF World Economic Outlook (2008) , Chapter 2 Country and Regional Perspectives, p. 52, October 2008, <http://www.imf.org/external/pubs/ft/weo/2008/02/pdf/c2.pdf>

### 3.3.4.2 Real Price of Large Letters

Projecting real price for either full rate (Other) or discounted (PreSort Barcoded) large letters is beyond the scope of this study.

There are however three primary determinants of future price movements: i) Inflationary pressures; ii) Australia Post pricing policy strategies; & iii) Regulatory approval at a nominal level.

Inflationary measures capture the change in the general level of prices in the near future with increases reducing the real price of posting a large letter, all other factors remaining constant.

The consensus appears to be that the general level of prices in Australia will grow by approximately 3.5% to 4.5% in 2008, by approximately 2.5% to 3.0% in 2009 and by approximately 3.0% in 2010.

The Reserve Bank of Australia forecast the Consumer Price Index (CPI) to grow by 3.7% in 2008, 2.5% in 2009 and 2.5% in 2010.<sup>29</sup>

The Commonwealth Bank forecasts CPI at 4.3% in 2008, 2.4% in 2009 and 3.1% in 2010.<sup>30</sup>

The Australia and New Zealand Bank (ANZ) forecasts CPI at 4.4% in 2008, 2.9% in 2009 and 3.1% in 2010.<sup>31</sup>

In the absence of nominal price fluctuations instigated by Australia Post, the above figures provide insight into expectations of a real decline in the price of a generic large letter in the short term.

In 2008 the Australian Competition and Consumer Commission (ACCC) did not object to Australia Post's notification for a price rise in the basic postal rate and as part of a wider pricing overhaul this might impact the real price of Other and PreSort Barcoded large letter volumes.

Pricing strategies beyond the short term are dependant upon Australia Post strategic direction and this lies outside the scope of this research undertaking.

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<sup>29</sup> RBA, STATEMENT ON MONETARY POLICY – February 2009, [http://www.rba.gov.au/PublicationsAndResearch/StatementsOnMonetaryPolicy/Statements/statement\\_on\\_monetary\\_0209.pdf](http://www.rba.gov.au/PublicationsAndResearch/StatementsOnMonetaryPolicy/Statements/statement_on_monetary_0209.pdf)

<sup>30</sup> Commonwealth Research (2009) 'Economic Perspective', Commonwealth Bank of Australia, January 30, 2009, [http://www.research.commbank.com.au/CBA\\_Research\\_Common\\_Functions/Display\\_Pdf/0,2226,29796,00.pdf](http://www.research.commbank.com.au/CBA_Research_Common_Functions/Display_Pdf/0,2226,29796,00.pdf)

<sup>31</sup> ANZ Economic Outlook(2009) March quarter 2009, <http://www.anz.com/documents/economics/AEO%20Mar%2009.pdf>

### 3.3.4.3 Estimated Australian Population

The Australian Bureau of Statistics (ABS) undertakes projections of the Australian population and presents them in the form of three series: A, B and C.<sup>32</sup>

In general, Series B represents projections of the Australian population based on current trends in fertility, life expectancy at birth, net overseas migration and net interstate migration<sup>33</sup>; Series A represents a more optimistic projection of the Australian population; and Series C represents a more pessimistic projection of the population.

Series B of the ABS' population projections is based on current trends and is has therefore been selected as the preferred projected series to outline in this section.

Previous population projections released by the Australian Bureau of Statistics (Series B), show that the Australian population was projected to grow at an annual average rate of 1.1% from 2007 to 2012.<sup>34</sup>

More recently the Australian Bureau of Statistics (ABS) has significantly upwardly revised their forward population projections reflecting changes more befitting of the current fertility, life expectancy and migration growth rates.

Specifically, again utilising Series B of the ABS population projections, the projected population growth figures for the next three years (2009, 2010 and 2011) equates to approximately 1.5% per annum.<sup>35</sup>

Extending the timeframe further, Series B's projected annual growth rates from 2008 to 2023 are presented in Chart 3.3.4.2, and illustrate annual growth rates that range from a low of 1.26 percent per annum to a high of 1.54 percent per annum.

These population growth projections (and associated increased number of households) are likely to result in natural gross increases in all large letter volume segments.

In addition, the Australian population is ageing and is projected to continue to do so into the foreseeable future.

Chart 3.3.4.3 depicts the annual average growth rates for Series B population projections over the 2008 to 2023 period at an age specific level.

The population ageing effect is evident via some of the key highlights associated with Series B projections to 2023:

- Persons aged 70 and over are projected to display the highest annual average growth rate i.e. 3.4 percent per annum over the 2008-2023 period;
- The number of persons aged 65-69 years are projected to grow at an annual average growth rate of 3.2 percent; &
- The number of persons aged 60-64 years is projected to grow by 2.0 percent per annum.

This trend is expected to have an effect on many sectors of the Australian economy and, in turn may impact future rates of large letter volume growth should a positive association between age and the quantity of letter mail sent/received exist.

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<sup>32</sup> Australian Bureau of Statistics (2006), Catalogue Number 3222.0, Population Projections, Australia, 2006 to 2101 <http://www.abs.gov.au/AUSSTATS/abs@.nsf/ProductsbyCatalogue/5A9C0859C5F50C30CA25718C0015182F?OpenDocument>

<sup>33</sup> Ibid

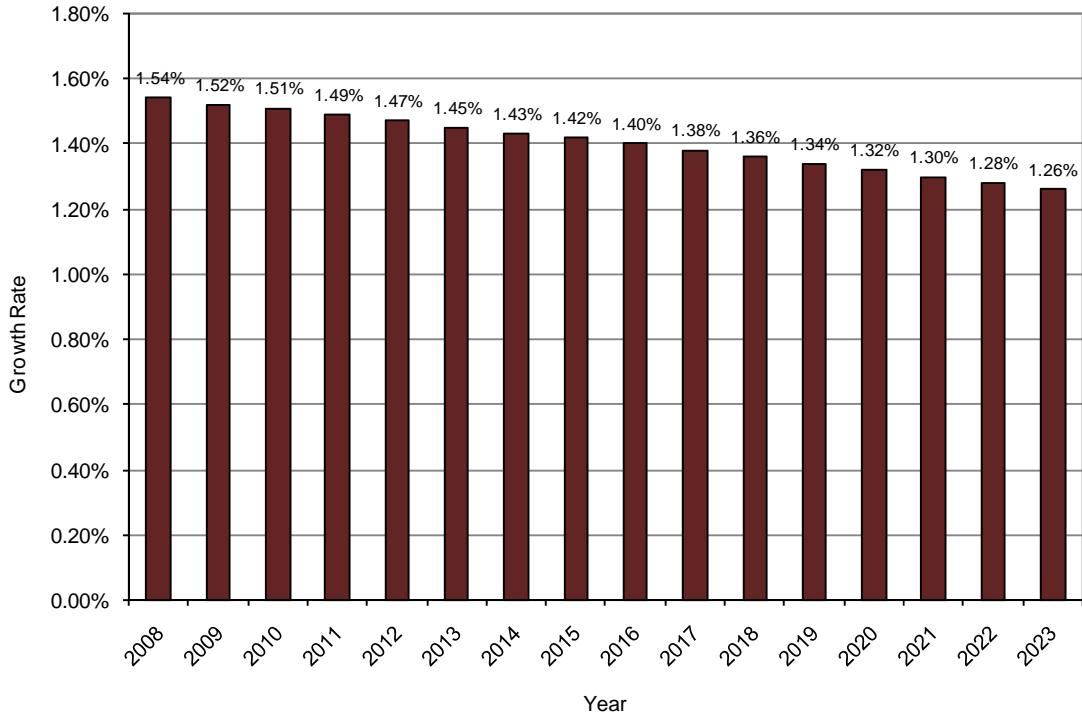
<sup>34</sup> Australian Bureau of Statistics (2006), Table 32220B9 Persons Grouped (Series B), Catalogue Number 3222.0, Population Projections, Australia, 2006 to 2101

<http://www.abs.gov.au/AUSSTATS/abs@.nsf/ProductsbyCatalogue/5A9C0859C5F50C30CA25718C0015182F?OpenDocument>

<sup>35</sup> Ibid

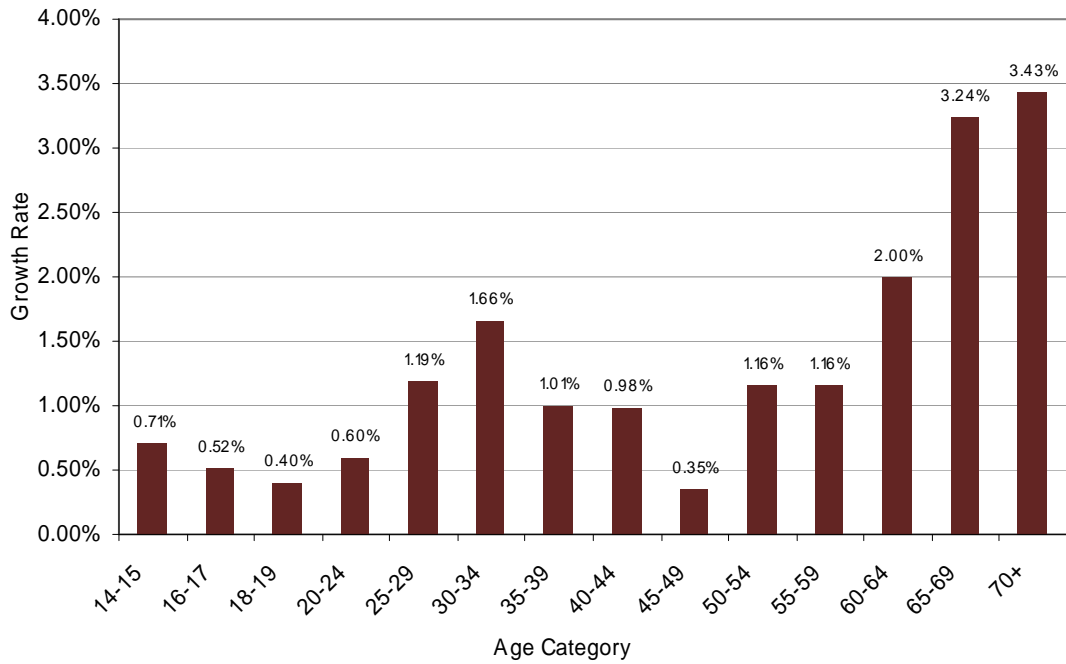
**Chart 3.3.4.2**

**Australian Population Projections Annual Growth Rate  
(2008 - 2023 Series B)**



**Chart 3.3.4.3.**

**Projected Population Average Annual Growth Rates by Age Category  
(2008-2023, Series B)**



### 3.3.4.4 Advertising Industry Health Measure

PreSort Barcoded large letter volumes are an aggregated total of transactional and promotional elements with the latter being driven largely by discretionary spend and the general state of the advertising industry.

Contributing to the recent decline in the Australian share market, the S&P/ASX 200 Consumer Discretionary Index fell by 34.92% in the 2007/08 financial year.

The index is consequently nearing its lowest level since early 2003 (See Chart 3.3.4.4) and this trend is critically important in determining any short term projections of the health of the advertising industry.

Industry analysts suggest that media stocks, which are a core element of the S&P/ASX 200 Consumer Discretionary Index, are expected to demonstrate marginal growth at best in 2008/09.<sup>36</sup>

The slowdown in the economy, and in particular, private consumption and low consumer confidence were posited as reasons leading to the downgrading of media stocks.<sup>37</sup>

It is projected that 2008/09 will reflect a cyclical trough for the advertising market with moderate market growth projected in 2009/10.<sup>38</sup>

In 2006, PricewaterhouseCoopers had projected the Australian entertainment and media sector to grow at a compounded annual growth rate (CAGR) of 7% from 2005 to 2010.<sup>39</sup>

In 2009 Aegis Media however now forecasts the Australian advertising industry to grow by only 1.7% in 2009.<sup>40</sup>

However once inflation is factored into the equation total advertising spend within Australia will decrease by 3 to 5 percent.

Of all the advertising mediums only online spend is expected to grow (at 9.7% unadjusted which equates to 5.7% adjusted for inflation).

In summary, the above evidence suggests the S&P/ASX 200 Consumer Discretionary Index is likely to experience a substantial decline in 2008/09.

The magnitude of the decline suggests that it will be unlikely that the index will make a full recovery (relative to levels attained a year ago) in the immediate future.

As a consequence, given the statistical significance of this variable it is reasonable to expect lower rates of growth for the promotional component of PreSort Barcoded large letter volumes.

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<sup>36</sup> Crikey (2008) 'Lean times looming for Australian media', 17 March 2008, <http://www.crikey.com.au/Media-Arts-and-Sports/20080317-Goldman-Sachs-JBWere-forecasts-lean-times-for-Australian-media.html>

<sup>37</sup> Ibid

<sup>38</sup> Ibid

<sup>39</sup> PricewaterhouseCoopers Australian Entertainment & Media Outlook: 2006 – 2010 (2006) <http://www.pwc.com/extweb/ncpressrelease.nsf/docid/f033c0c8d26490f7ca2571bd007d058c>

<sup>40</sup> Aegis Media (2009) as reproduced in 'Local advertising expecting flat growth for the year', The Australian, [http://www.theaustralian.news.com.au/story/0,,24971959-7582,00.html?from=public\\_rss](http://www.theaustralian.news.com.au/story/0,,24971959-7582,00.html?from=public_rss)

**Chart 3.3.4.4.**

**S&P/ASX 200 Consumer Discretionary Index**  
Jun 00 - Jun 08 (Quarterly)



### 3.3.4.5 Australian Retail Trade Industry

Australia and New Zealand Banking Group Limited (ANZ) research suggests a slowdown in retail trade activity is projected in the 2009 calendar year.<sup>41</sup>

Their forecasted growth in real retail trade turnover suggests a decline of 2.1% in 2009.

As a broader measure, the Australian Government has forecast household consumption to ease, growing by 1.75% in 2008/09 in comparison to estimated growth for 2007/08 of 4.5%.<sup>42</sup>

In mid 2008, the Westpac-Melbourne Institute survey of consumer sentiment indicated that consumer sentiment was at its lowest point in 16 years.<sup>43</sup>

Reduced consumer optimism is also reflected in the number of new loans for owner-occupied housing which declined by 25% from February 2008 to May 2008.<sup>44</sup>

The tighter household budgets combined with an increasing uncertainty in the labour market will directly impact retail trade activity and this is expected to manifest itself in the form of lower transactional and promotional large letter volumes.

### 3.3.4.6 Large Letter Delivery Performance:

Large letter delivery performance has not been projected by Diversified Specifics.

It is not possible to comment on future movements in this variable given delivery performance is largely driven by Australia Post resourcing and value chain issues.

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<sup>41</sup> ANZ Economic Outlook (2008), June Quarter 2008, <http://www.anz.com/documents/economics/AEO%20Jun%2008.pdf>

<sup>42</sup> Commonwealth Budget Papers (2009), Updated Economic and Fiscal Outlook, Part 3: Economic Outlook, February 2009, [http://www.budget.gov.au/2008-09/content/uefo/download/UEFO\\_03\\_Part\\_3.pdf](http://www.budget.gov.au/2008-09/content/uefo/download/UEFO_03_Part_3.pdf)

<sup>43</sup> The Age (2008) 'Consumer outlook dims', July 9, 2008, <http://business.theage.com.au/consumer-outlook-dims-20080709-3c9o.html>

<sup>44</sup> The Age (2008) 'Thousands give up on home ownership dream', July 10, 2008, <http://www.theage.com.au/national/thousands-give-up-on-home-ownership-dream-20080709-3cl9.html>

### 3.3.5 INTERNATIONAL EXPERIENCE

International research on large letter volumes, or its country specific equivalents, is not as advanced as is the case for smaller (or standard) size letters.

Despite this, Diversified Specifics has undertaken a review of the existing literature that relates to the hypotheses surrounding large letter volumes in an attempt to contextualise the Australian situation and to highlight any relevant similarities.

#### 3.3.5.1 Australian Non-Farm GDP

Globally many studies have demonstrated the positive association between mail volumes and economic activity (Cuthbertson, K. and Richards, P., 1990<sup>45</sup>; Nankervis and Rodriguez, 1995<sup>46</sup>; Pimenta and Ferreira, 1999<sup>47</sup>; Florens, J. P., Marcy, S., and Toledano, J., 2002<sup>48</sup>; World Bank Group, 2004<sup>49</sup>; Diversified Specifics, 2002<sup>50</sup> & 2008<sup>51</sup>).

Most of these studies however tend to focus on the association at an aggregate mail or, indeed, small letter level with a noticeable absence of focus on the large letter volume segment in isolation.

In the United States the approximate equivalent of large letters in Australia is referred to as flat mail.

Recent studies in the U.S. (Tisdahl, 2007) attribute slow (0.56%p.a) flat mail average annual growth rates between 2002 and 2006 to the wide recessionary effects within the U.S. in 2001 and 2002.<sup>52</sup>

The Tisdahl 2007 study however does not ratify these theoretical arguments with any formal empirical testing.

Drawing a comparison to Australian single piece (Other) large letter volumes, in the United States recently a declining trend is observable in the household generated flat mail category.

This decline manifested itself in two areas over the 2002 and 2005 time period: i) Household to household volumes fell by 6%.<sup>53 54</sup>; & 2) Household to business volumes fell by 44%.<sup>55 56</sup>

The Tisdahl study attributes the majority of this decline to electronic substitution rather than economic growth related matters.<sup>57</sup>

Business originating flat mail is the important sub-segment within the entire United States flat mail market comprising 98% of total flat mail items (76% are business to household and 22% business to business).<sup>58</sup>

Given these weightings the link between economic activity and bulk (workshared) transactional and promotional letter volumes is important as these volumes tend to be by definition business originating.

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<sup>45</sup> Cuthbertson, K & Richards, P (1990) 'An Econometric Study of the Demand for First and Second Class Inland Letter Service', *The Review of Economics and Statistics*, v. 72, No. 4, pp. 640-648.

<sup>46</sup> Nankervis, J., and Rodriguez, F. (1995) 'Aggregate Letter Traffic Demand in the United Kingdom and the Economy', in *Commercialization of Postal and Delivery Services*, ed. Crew, M. and Kleindorfer, P. Boston: Kluwer Academic Publishers.

<sup>47</sup> Pimenta A, and Ferreira. P (1999) 'Demand for Letters in Portugal', in *Emerging Competition in Postal and Delivery Services*, ed. Crew, M. and Kleindorfer, Boston: Kluwer Academic Publishers.

<sup>48</sup> Florens, JP, Marcy, S and Toledano, J (2002) 'Mail Demand in the Long and Short Term', in *Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy*, ed. Michael A. Crew and Paul R. Kleindorfer, Boston: Kluwer Academic Publishers.

<sup>49</sup> World Bank Group (2004) 'The Postal Sector in Developing and Transition Countries'.

<sup>50</sup> Diversified Specifics (2002) 'Executive Summary: Small Letter Volume Analysis'.

<sup>51</sup> Diversified Specifics (2007) 'Domestic Small Letter Segment Volume Demand 1995/96 to 2006/07 Public Document', December 2007

<sup>52</sup> Bradley Tisdahl (2007) 'U.S. Flat Mail Market: 2002-2006', Pitney Bowes: Future of Mail: Paper No. 2007-3, May, 2007, p.6

<sup>53</sup> It should be noted that the USPS Household Diary Study indicates that items included in this category largely consist of greeting cards, invitations and announcements and this is not expected to differ from the inclusions within the Other large letter volume category in the Australian case for household to household type mail.

<sup>54</sup> Bradley Tisdahl, Op. Cit, p.34

<sup>55</sup> The substituted flats are assumed to include income tax forms, college and job applications and like matter. Again, the underlying characteristics of this United States large letter segment are not expected to differ greatly from the household to business segment of the Other large letter volume category in the Australian case.

<sup>56</sup> Bradley Tisdahl, Op. Cit, p.35

<sup>57</sup> Ibid. Again, formal empirical testing of these beliefs is not undertaken to provide more conclusive evidence.

<sup>58</sup> Bradley Tisdahl, Op. Cit, p.7



Again the international literature tends to bypass a separate discussion on the large letter volume component yet in the United States case, workshared first class letters do exhibit a significant positive association with economic activity.

Table 3.3.5.1 highlights the findings of seminal studies where positive statistical associations concerning workshared letter volumes have been derived although it is important to recall these studies are broader than the large letter level.

In general the association between economic growth and letter volumes is viewed as a robust driver of total, segmented and workshared letter volumes however the literature suggests, internationally, the nature of the association has recently altered because of the varied impacts of competition, the changing mail mix and the crowding out effects of substitution.

**Table 3.3.5.1**

**Statistical Associations between Workshared Letter Volumes and Aspects of Economic Activity**

Study	Country	Key Finding
<b>Tolley &amp; Thress (1997<sup>59</sup>, 2000<sup>61</sup> and 2001<sup>62</sup>)</b>	U.S.	Identified a positive association between permanent and transitory income and Workshared first class letter volumes. In each of these studies a consistent finding was permanent income, when used as a measure of economic activity, positively associated with Single Piece First Class Letters.
<b>Bernstein (2005)<sup>63</sup></b>	U.S.	First-Class workshared letters are positively associated with economic activity although the association appears to be weakening in recent times.
<b>Florens, J. P., Marcy, S. and Toledano, J. (2002)<sup>64</sup></b>	France	This study demonstrated France's Second Class Non-urgent mail (i.e. bulk financial mail and advertising mail) was positively associated with economic activity.

Despite the lack of international studies that precisely compare to that of the Australian experience regarding large letters, numerous studies have identified economic growth as a statistically significant and key driver of postal volumes.

Table 3.3.5.2 aims to demonstrate the overall importance of the association between economic growth and letter volume demand at differing levels.

<sup>59</sup> Tolley G. (1997) 'Direct Testimony of George Tolley on Behalf of the United States Postal Service', docket R1997-1.

<sup>60</sup> Thress, T. (1997) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R97-1.

<sup>61</sup> Thress, T. (2000) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2000-1.

<sup>62</sup> Thress, T. (2001) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2001-1.

<sup>63</sup> Bernstein, P (2005) 'Direct Testimony of Peter Bernstein on Behalf of the United States Postal Service', docket R2005-1

<sup>64</sup> Florens, J. P., Marcy, S. and Toledano, J. (2002) 'Mail Demand in the Long and Short Term', in Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy, ed. Michael A. Crew and Paul R. Kleindorfer, Boston: Kluwer Academic Publishers.

**Table 3.3.5.2**

**Statistical Associations between Letter Volumes and Aspects of Economic Activity**

Study	Country	Key Finding
<b>Nankervis, Richard, Soteri and Rodriguez (2002)</b> <sup>65</sup>	U.K.	Economic activity was determined to be a stronger predictor of First Class mail.
<b>Tolley &amp; Thress (1997)</b> <sup>66,67</sup> , <b>2000</b> <sup>68</sup> and <b>2001</b> <sup>69</sup>	U.S.	In the United States Single Piece First Class Letters are the most similar offering to Australia's 'Other' letter product stream. In each of these studies a consistent finding was permanent income, when used as a measure of economic activity, positively associated with Single Piece First Class Letters.
<b>Diakova (2005)</b> <sup>70</sup>	Generic	This study acknowledges the emergence of factors that have altered the nature of the association between economic activity and total mail volumes in recent times. Specifically, the growth in advertising mail is closely related increases in economic activity which is likely to remain a strong predictor of future advertising mail.
<b>Nikali (1993)</b> <sup>71</sup> <b>(1997)</b> <sup>72</sup>	Finland	The 1993 study found Ordinary Domestic First Class mail to be positively associated with Gross National Product (GNP). The results were replicated in 1997, albeit using building approval data as a proxy measure of economic activity.
<b>Dubin (1998)</b> <sup>73</sup> <b>(2001)</b> <sup>74</sup>	Canada	This study provided evidence that Canada's retail sales activity (utilised as a measure of economic activity) was positively associated with letter mail (the classification of which included both standard and bulk letters).

<sup>65</sup> Nankervis, J., Richard, S., Soteri, S. and Rodriguez, F. (2002) 'Disaggregated Letter Traffic Demand in the UK', in *Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy*, ed. Crew, M. and Kleindorfer, Boston: Kluwer Academic Publishers

<sup>66</sup> Tolley G. (1997) 'Direct Testimony of George Tolley on Behalf of the United States Postal Service', docket R1997-1.

<sup>67</sup> Thress, T. (1997) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R97-1.

<sup>68</sup> Thress, T. (2000) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2000-1.

<sup>69</sup> Thress, T. (2001) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2001-1.

<sup>70</sup> Diakova, Elena (2005) 'Economic Activity as a Driver of Mail', (Pitney Bowes), Background Paper No. 12, August 8, 2005

<sup>71</sup> Nikali, H. (1993) 'Study of Demand on Postal Services', mimeo, Posts and Telecommunications of Finland.

<sup>72</sup> Nikali, H. (1997) 'Demand Models for Letter Mail and its Substitutes: Results from Finland', in *Managing Change in the Postal and Delivery Industry*, ed. Michael A. Crew and Paul R. Kleindorfer. Boston: Kluwer Academic Publishers.

<sup>73</sup> Dubin, J. (1998) 'The Demand for Direct Admail and Complementary Products in Canada', in *Studies in Consumer Demand—Econometric Methods Applied to Market Data*. Boston, Massachusetts: Kluwer Academic Publishers.

<sup>74</sup> Dubin, J. (2001) 'Detecting and Measuring Shifts in The Demand For Direct Mail', in *Empirical Studies in Applied Economics*, Boston, Massachusetts: Kluwer Academic Publishers, 2001.

### 3.3.5.2 Real Price of Other Large Letters

United States (U.S) testimony in the Postal Regulatory Commission estimates the aggregated price elasticity of flat mail (the equivalent to total large letters in Australia) rests somewhere between 0.78 and 1.098.<sup>75</sup>

The upper limit on this elasticity is calculated via a model that accounts for the differences between mail sorted via modern sorting equipment against the manual sorting processes whereas the lower limit does not account for such differences.<sup>76</sup>

Clarity on the exact estimate of the price elasticity is important because when greater than unitary, a price increase would imply declining revenues on large letter mail in the U.S.

Delineating large letters in the U.S. and internationally, it was not possible to obtain a price elasticity that bears a direct comparison to Australia's Other large letter product stream. Nonetheless, presented below is a summary of international studies related to the price of non-bulk letter mail. Own price elasticities are presented below, in each case holding all other model predictors constant.

Tolley and Thress (1997<sup>77</sup>, 2000<sup>79</sup>, 2001<sup>80</sup>) generated own price elasticities for U.S. Single Piece First Class Mail and report elasticity measures ranging from -0.329 to -0.395.

Subsequent studies by Thress (2005)<sup>81</sup> and Bernstein (2005)<sup>82</sup> illicit lower own price elasticities for U.S. Single Piece First Class Mail; ranging from -0.252 to -0.285

In the U.K., own price elasticities for Second Class letters have been estimated via numerous studies. Specifically, Cuthbertson and Richards (1990) determined that own price elasticities for Second Class letters was found to be -0.90 over the 1976 to 1988 period.<sup>83</sup>

Nankervis et al (2002) estimated own price elasticities for Second Class letters to be -0.61 over the 1976-1999 time period.<sup>84</sup>

In a study conducted by Royal Mail (2003), significantly lower own price elasticities were estimated for Second Class letters.<sup>85</sup> In particular, the own price elasticity for Second Class letters was estimated at -.30.<sup>86</sup>

### 3.3.5.3 Real Price of PreSort Barcoded Large Letters

Dubin (1998<sup>87</sup> and 2001<sup>88</sup>) estimated that all advertising mail (referred to as admail) in Canada was price inelastic.

Dubin's 2001 study also found that smaller advertising letters (i.e. short and long admail) having an elasticity of demand equal to -0.157 were less elastic than larger advertising letters (oversize admail) which had an elasticity of demand equal to -0.654.<sup>89</sup>

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<sup>75</sup> Tisdahl, Bradley (2007) 'U.S. Flat Mail Market: 2002-2006', Pitney Bowes: Future of Mail: Paper No. 2007-3, May, 2007

<sup>76</sup> Ibid

<sup>77</sup> Tolley G. (1997) 'Direct Testimony of George Tolley on Behalf of the United States Postal Service', docket R1997-1.

<sup>78</sup> Thress, T. (1997) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R97-1.

<sup>79</sup> Thress, T. (2000) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2000-1.

<sup>80</sup> Thress, T. (2001) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2001-1.

<sup>81</sup> Thress, T. (2005) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2005-1.

<sup>82</sup> Bernstein, P. (2005) 'Direct Testimony of Peter Bernstein on Behalf of the United States Postal Service', docket R2005-1.

<sup>83</sup> Cuthbertson, K. and P. Richards (1990) 'An Econometric Study of the Demand for First and Second Class Inland Letter Service', *The Review of Economics and Statistics*, v. 72, No. 4, pp. 640-648.

<sup>84</sup> Nankervis, J., Richard, S., Soteri S., and Rodriguez, F. (2002) 'Disaggregated letter traffic demand in the UK', in *Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy*, ed. Michael A. Crew and Paul R. Kleindorfer, 203-218. Boston: Kluwer Academic Publishers.

<sup>85</sup> Alan Robinson (2007) 'A Review of Price Elasticity Models for Postal Products', Direct Communications Group, 2007

<sup>86</sup> Ibid

<sup>87</sup> Dubin, J. (1998) 'The Demand for Direct Admail and Complementary Products in Canada', in *Studies in Consumer Demand—Econometric Methods Applied to Market Data*. Boston, Massachusetts: Kluwer Academic Publishers.

<sup>88</sup> Dubin, J. (2001) 'Detecting and Measuring Shifts in The Demand For Direct Mail', in *Empirical Studies in Applied Economics*, Boston, Massachusetts: Kluwer Academic Publishers, 2001.

<sup>89</sup> Ibid

In 1998 Dubin also determined that letter mail, which had an estimated elasticity of demand equal to -0.324, was even more inelastic than advertising mail.<sup>90</sup>

Studies conducted by Tolley (1997<sup>91</sup>, 2000<sup>92</sup>, 2001<sup>93</sup>) and Thress (1997<sup>94</sup>, 2000<sup>95</sup>, 2001<sup>96</sup>, 2005<sup>97</sup>) reveal that Workshered First Class mail in the U.S. is highly inelastic with estimated elasticity of demand ranging from -0.071 to -0.568.

Bernstein (2005)<sup>98</sup> cites Thress' 2005 estimates of elasticity of demand for Workshered First Class mail in the U.S., which is estimated to be highly inelastic at -0.329. Bernstein also presents Thress' elasticity of demand estimates for Standard Regular Class mail (equal to -0.267), providing further support that advertising mail in the U.S. is inelastic.

Florens et al estimate France's elasticity of demand for non-urgent second class mail (which is made up of advertising mail and bulk financial mail such as bills and statements) to be -0.68.<sup>99</sup>

In Finland, two studies conducted by Nikali (1993<sup>100</sup> and 1997<sup>101</sup>) estimated the price elasticity of demand of First Class Letters to range between -0.400 and -0.780. Moreover, an analysis of bulk letter mail by Nikali (1993), which consisted of bulk business letters and publication letters, suggested that demand was inelastic for this product (elasticity estimate equalled -0.300).

Utilising United Kingdom (U.K.) data from 1976 to 1988, Cuthbertson and Richards (1990) demonstrated that First Class letters were characterised by elastic demand (-2.000) whilst Second Class letters were characterised by inelastic demand (-0.900).<sup>102</sup>

The results from a more recent study by Nankervis et al (2002) contradicted the Cuthbertson study by estimating the demand for First Class Letters to be inelastic (-0.910).<sup>103</sup> The study extended to Second Class letters and suggested that demand for this product stream was estimated to be even more inelastic (-0.610).

Nankervis et al also estimated the elasticity of demand for Pre-sort letters in the U.K to be inelastic at -0.32.<sup>104</sup>

Royal Mail's analysis of demand conducted in 2003 utilising data from 1976 to 2000 showed elasticity of demand for First Class letters to be -0.680; -0.30 for Second Class letters; and -0.38 for PreSort letters.<sup>105</sup>

Nikali (1993) estimated the own price elasticity of Ordinary Domestic First Class letters over the 1971-1991 timeframe to be -0.4.<sup>106</sup> Moreover, a subsequent study by Nikali (1997) in which additional variables were added to the econometric model, resulted in a higher estimate of own price elasticity of Ordinary Domestic First Class letters i.e. -0.78.<sup>107</sup>

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<sup>90</sup> Dubin, J. (1998) 'The Demand for Direct Admail and Complementary Products in Canada', in *Studies in Consumer Demand—Econometric Methods Applied to Market Data*. Boston, Massachusetts: Kluwer Academic Publishers.

<sup>91</sup> Tolley G. (1997) 'Direct Testimony of George Tolley on Behalf of the United States Postal Service', docket R97-1.

<sup>92</sup> Tolley G. (2000) 'Direct Testimony of George Tolley on Behalf of the United States Postal Service', docket R2000-1.

<sup>93</sup> Tolley G. (2001) 'Direct Testimony of George Tolley on Behalf of the United States Postal Service', docket R2001-1.

<sup>94</sup> Thress, T. (1997) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R97-1

<sup>95</sup> Thress, T. (2000) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2000-1.

<sup>96</sup> Thress, T. (2001) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2001-1.

<sup>97</sup> Thress, T. (2005) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2005-1.

<sup>98</sup> Bernstein, P. (2005) 'Direct Testimony of Peter Bernstein on Behalf of the United States Postal Service', docket R2005-1.

<sup>99</sup> Florens, J. P., S. Marcy, and J. Toledano (2002) 'Mail demand in the long and short term', in *Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy*, ed. Michael A. Crew and Paul R. Kleindorfer, 171-190. Boston: Kluwer Academic Publishers.

<sup>100</sup> Nikali, H. (1993) 'Study of Demand on Postal Services', mimeo, Posts and Telecommunications of Finland.

<sup>101</sup> Nikali, H. (1995) 'Replacement of letter mail by electronic communications to the year 2010', in *Commercialization of Postal and Delivery Services*, ed. Michael A. Crew and Paul R. Kleindorfer, 223-235. Boston: Kluwer Academic Publishers.

<sup>102</sup> Cuthbertson, K. and Richards, P. (1990) 'An Econometric Study of the Demand for First and Second Class Inland Letter Service', *The Review of Economics and Statistics*, v. 72, No. 4, pp. 640-648.

<sup>103</sup> Nankervis, J., Richard, S., Soteri S., and Rodriguez, F. (2002) 'Disaggregated letter traffic demand in the UK', in *Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy*, ed. Michael A. Crew and Paul R. Kleindorfer, 203-218. Boston: Kluwer Academic Publishers.

<sup>104</sup> Ibid

<sup>105</sup> Robinson, Alan (2007) 'A Review of Price Elasticity Models for Postal Products', Direct Communications Group, 2007

<sup>106</sup> Nikali, H. (1993) 'Study of Demand on Postal Services', mimeo, Posts and Telecommunications of Finland.

<sup>107</sup> Nikali, H. (1997) 'Demand Models for Letter Mail and its Substitutes: Results from Finland', in *Managing Change in the Postal and Delivery Industry*, ed. Michael A. Crew and Paul R. Kleindorfer. Boston: Kluwer Academic Publishers.

The French study by Florens et al (2001), estimates the own price elasticity of Letters over the 1969-1999 period to be -0.30.<sup>108</sup>

### 3.3.5.4 Advertising Industry Health Measure

In general, international research indicates that advertising spend is a key indicator of the health of the advertising industry.

Bernstein (2005) demonstrated that overall advertising spend in the United States is positively associated with Standard regular mail (i.e. bulk, sorted, discounted promotional / advertising mail).<sup>109</sup>

The positive association between advertising spend and standard regular mail volumes holds over time throughout the 1981 – 2004 timeframe considered in the study.

In the UK, direct mail demand has been decreasing as of late where there has been a 3% decline in direct mail volumes between 2003 and 2007.

Such evidence appears to be at odds with what is occurring in other countries (i.e. in that same time direct mail in the United States has increased by 4%).

This is an important finding given many postal authorities believed (circa 2003) a general decline in transactional based mail (due to the combined effects of substitution, competition and consolidation) would be (at-least partly) offset by an increase in direct mail.

Studies still in the preliminary stages at Royal Mail suggest (by providing advertising spend evidence) a shift in discretionary advertising spend towards internet advertising at the expense of other promotional channels (of which the traditional mail item is one) might be occurring.

### 3.3.5.5 Australian Retail Trade Industry

Studies in both the United States and Canada associate retail sales with advertising mail.<sup>110</sup>

Furthermore, Dubin (2001) demonstrated that oversize mail differs in its association with Canadian retail sales than does the non-oversize product (i.e. short and long admail).<sup>111</sup>

Specifically, Dubin demonstrated that oversize mail is more responsive to fluctuations in Canadian retail sales than non-oversize mail.

The U.S. equivalent of PreSort promotional mail is Standard Regular mail which is targeted (addressed), lodged in bulk (minimum quantity is 200 pieces) and pre sorted.<sup>112</sup>

Tolley (2001)<sup>113</sup> and Thress (2001)<sup>114</sup> and Bernstein<sup>115</sup> and Thress (2005)<sup>116</sup> identified a positive association between Standard Regular mail and U.S. retail sales.

Bernstein<sup>117</sup> and Thress (2005)<sup>118</sup> determined that a five percent increase in retail sales was associated with a 0.52% increase in Standard Regular mail volumes.

Thress (2005) also determined that U.S. retail sales are positively associated with Workshared First Class letters. This product stream predominantly consists of bulk sorted transactional letters sent by business.

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<sup>108</sup> Florens, JP, Marcy, S and Toledano, J (2002) 'Mail Demand in the Long and Short Term', in *Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy*, ed. Michael A. Crew and Paul R. Kleindorfer, Boston: Kluwer Academic Publishers.

<sup>109</sup> Bernstein, P (2005) 'Direct Testimony of Peter Bernstein on Behalf of the United States Postal Service', docket R2005-1

<sup>110</sup> Robinson, Alan (2007) 'A Review of Price Elasticity Models for Postal Products', Direct Communications Group, 2007

<sup>111</sup> Dubin, J. (2001) 'Detecting and Measuring Shifts in The Demand For Direct Mail', in *Empirical Studies in Applied Economics*, Boston, Massachusetts: Kluwer Academic Publishers, 2001.

<sup>112</sup> Robinson, Alan (2007) 'A Review of Price Elasticity Models for Postal Products', Direct Communications Group, 2007

<sup>113</sup> Tolley G. (2001) 'Direct Testimony of George S. Tolley (USPS-T-7) on Behalf of the United States Postal Service', docket R2001-1.

<sup>114</sup> Thress, T. (2001) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2001-1.

<sup>115</sup> Bernstein, P (2005) 'Direct Testimony of Peter Bernstein on Behalf of the United States Postal Service', docket R2005-1.

<sup>116</sup> Thress, T. (2005) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2005-1.

<sup>117</sup> Bernstein, P (2005) 'Direct Testimony of Peter Bernstein on Behalf of the United States Postal Service', docket R2005-1.

<sup>118</sup> Thress, T. (2005) 'Direct Testimony of Thomas Thress on Behalf of the United States Postal Service', docket R2005-1.

### 3.3.5.6 Large Letter Delivery Performance

Total letter volumes over the longer term in the U.K. have exhibited a positive association with quality of delivery performance i.e. a measure of on-time delivery (see Albon (1991)<sup>119</sup>, Nankervis, Carslake and Rodriguez (1999)<sup>120</sup>, Nankervis, Richard, Soteri and Rodriguez (2002)<sup>121</sup>).

Moreover, segmented U.K. letter volumes into first and second class mail streams also generated positive associations with quality of service (Albon (1991)<sup>122</sup>, Nankervis, Richard, Soteri and Rodriguez (2002)<sup>123</sup>) and Royal Mail price application Submission (2003).<sup>124</sup>

In another study on Second Class Mail conducted for Royal Mail, the long run elasticity measurement of quality of service was found to be 0.49.<sup>125</sup>

These results suggest perceptions relating to delivery quality possess a statistically significant impact on the demand for total letter volumes in addition to segmented letter volumes in the U.K. over the longer term.

### 3.3.5.7 Major Events

Clearly the September 11 terrorist attacks were likely to have the most significant impact on the U.S.

At the time of the attacks, the U.S. economy halted with the impact on the economy and financial markets profound.

Studies have since revealed postal volumes were also negatively impacted.

Pearsall (2004) suggests that whilst the September 11 terrorist attacks had a significant short-term negative effect on demand for mail volumes, it was the subsequent Anthrax attacks (i.e. lacing letters with Anthrax) that had the more enduring and severe negative impact on mail demand.<sup>126</sup>

The Anthrax attacks resulted in a temporary loss of confidence in the safety of mail and inferior mail delivery performance (as mail was quarantined and subsequently subjected to increased security checks and medical treatment provided to exposed staff, etc).<sup>127</sup>

Perceptions of mail quality deteriorated as a result causing reduced demand for mail.

Pearsall quantified the overall impact on volumes to be approximately 4% whilst the revenue loss was estimated to equate to approximately 5% although the proportion of this attributable to the large letter component is not known.

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<sup>119</sup> Albon, R. (1991) 'The future of postal services', Institute of Economic Affairs, London.

<sup>120</sup> Nankervis, J., Carslake, I. and Rodriguez, F. (1999) 'How important have price and quality of service been to mail volume growth?', in *Emerging Competition in Postal and Delivery Services*, ed. Michael A. Crew and Paul R. Kleindorfer, 229-244. Boston: Kluwer Academic Publishers.

<sup>121</sup> Nankervis, J., Richard, S., Soteri S., and Rodriguez, F. (2002) 'Disaggregated letter traffic demand in the UK', in *Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy*, ed. Michael A. Crew and Paul R. Kleindorfer, 203-218. Boston: Kluwer Academic Publishers.

<sup>122</sup> Albon, R. (1991) 'The future of postal services', Institute of Economic Affairs, London.

<sup>123</sup> Nankervis, J., Richard, S., Soteri S., and Rodriguez, F. (2002) 'Disaggregated letter traffic demand in the UK', in *Postal and Delivery Services: Pricing, Productivity, Regulation, and Strategy*, ed. Michael A. Crew and Paul R. Kleindorfer, 203-218. Boston: Kluwer Academic Publishers.

<sup>124</sup> Robinson, Alan (2007) 'A Review of Price Elasticity Models for Postal Products', Direct Communications Group, 2007.

<sup>125</sup> Frontier Economics (2005) 'Volume Modelling for the Price Control' Report prepared for PostComm.

<sup>126</sup> Pearsall, Edward S. (2004) 'The Effects of Worksharing, Other Product Innovations and the 9/11-Anthrax Attack on U.S. Postal Volumes and Revenues' Presented June 2-5, 2004 at the Twelfth Conference on Postal and Delivery Economics, Cork, *Ireland*. To be published in *Regulatory and Economic Changes in the Postal and Delivery Sector*, Eds. Michael A. Crew and Paul R. Kleindorfer (Boston, MA: Kluwer Academic Publishers, 2004).

<sup>127</sup> Ibid

## 4.0 MODELS, DRIVERS & ELASTICITIES



#### 4.1. PRESORT BARCODED ECONOMETRIC MODELS

The preferred PreSort Barcoded large letter model developed in this research undertaking is presented below.

The variables determined to exhibit statistical significance when associated with PreSort Barcoded large letter volumes include: (i) Non-farm Gross Domestic Product; (ii) The health of the advertising industry measure; and (iii) The introduction of barcoding.

**Table 4.1.1.1**

**PreSort Barcoded Large Letter Volume Forecast Model**

PreSort Barcoded Large Letter Volumes**			
Forecast model: July 1995 – June 2008			
-13.5806856888606	1.02589854177393	0.301654180704488	0.163157451575772
	Non-farm GDP**	Advertising Industry Health Measure#	Barcoding Introduction (Oct 99)
<b>Explains 89.45% of the total quarterly variation in PreSort Barcoded Large Letter Volumes</b>			
<b>*Denotes: Seasonally Adjusted Variable</b>			
<b>#Denotes: Natural Logarithm</b>			

#### **Alternative Models: Industry Economic Activity**

In addition to the preferred PreSort Barcoded large letter model, an analysis of such volumes was undertaken at an industry level based upon segmented economic activity measures.

Specifically, Non-farm Gross Domestic Product (GDP) was substituted in the preferred model with each of the individual economic activity measures for the following industries: Communication, Finance and Insurance, Government Administration and Defence, Property & Business Services, Retail Trade and Manufacturing.

The selection of these industries was based on market share data supplied to Diversified Specifics by Australia Post.<sup>128</sup>

The industry models summary is presented below together with the model's respective explanatory power (Adjusted R<sup>2</sup>) and Durbin-Watson Statistics (Statistical outputs and further technical analysis pertaining to the development of these models are presented in the Descriptive and Statistical Analysis document that partners this report).

**Table 4.1.1.2**

**PreSort Barcoded Large Letter Volume Industry Models**

Industry Model	Timeframe	Adjusted R <sup>2</sup>	Durbin-Watson Statistic
Communication	Sep95 – Jun08	89.5%	1.988
Finance and Insurance	Sep95 – Jun08	88.6%	1.838
Government Administration and Defence	Sep95 – Jun08	89.3%	1.989
Property & Business Services	Sep95 – Jun08	90.2%	2.177
Retail Trade	Sep95 – Jun08	89.5%	2.048
Manufacturing	Sep95 – Jun08	87.2%	1.787

The explanatory power of the industry models ranged from 87.2% (for Manufacturing) to 90.2% (for Property & Business Services).

As an interpretative example, the communication industry model explains 89.5% of the total quarterly variation in PreSort Barcoded large letter volumes over the July 1995 to June 2008 period.

<sup>128</sup> Market share data based on charge account data supplied to Diversified Specifics as at 2003.



This compares to the preferred PreSort Barcoded large letter model which explains 89.45% of the total quarterly variation in PreSort Barcoded large letter volumes over the same timeframe.

Overall, the alternative industry models exhibit similar explanatory power to the preferred forecasting model, which utilises Non-farm GDP as a key driver of volumes.

Therefore, in the absence of any significant differences in explanatory power, the use of Non-farm GDP is preferred to industry economic activity for the following reasons:

- Non-farm GDP is a broad and all encompassing measure of economic activity and therefore a true indicator of overall economic activity;
- Non-farm GDP may be less volatile in comparison to specific industry economic activity which is subject to various industry-based idiosyncrasies; and
- Government and Non-Government forecasts of Non-farm GDP are publicly available and regularly monitored and updated, enabling the integration of such forecasts into the preferred forecasting model.

## 4.2. OTHER LARGE LETTER ECONOMETRIC MODELS

A two stage process was the approach adopted by Diversified Specifics when modelling Other large letter volume demand at Australia Post.

The rationale behind such a methodology stems from statistical and anecdotal evidence that suggests that electronic substitution acted (in the late nineties to early 2000 period) to shift the demand curve downwards for this product stream.

In that period, substitutive mediums began to emerge and progressively lowered traditional single piece large letter volumes (mainly under the guise of online forms for completion over the internet and document transmissions via email).

However, as previously discussed within Section 3 of this document, the substitutable component of Other large letters began to shift the Other large letter volume demand curve downwards prior to the year 2000 and crowded out any association with fluctuations in the level of economic activity.

The difficulty in quantifying the exact elasticity attributable to this substitution effect stemmed from the impossibility of finding an appropriate variable that captured: a) The number of documents sent via email (at the expense of a traditional large letter item); and b) The growth in online information and forms that were formally the domain of a traditional large letter item.

Such a variable that measures these effects is not readily available and Diversified Specifics therefore utilised a number of dichotomous variables to reflect the differing 'stages' of electronic substitution over the course of the entire 1996 to 2008 timeframe.

The resultant Model A (presented in Table 4.2.1.1 below) indicated that Other large letter volume demand was driven to a lesser extent by movements in the level of economic activity and specified two differing downward shifts in the letter volume demand curve.

**Table 4.2.1.1**  
**Model A: January 1996 – June 2008**

Other Large Letter Volumes**				
Forecast model: January 1996 – June 2008				
0.616887125104	0.2832588615648	-0.09719705437199	-0.1603843346745	0.08213627422571
	Non-farm GDP*#	Substitution Measurement (September 2000 to September 2001)	Substitution Measurement (December 2001 to December 2007)	Closure of the Unbarcoded PreSort Service
<b><i>Explains 56.93% of the total quarterly variation in Other Large Letter Volumes</i></b>				
<b><i>*Denotes: Seasonally Adjusted Variable</i></b>				
<b><i>#Denotes: Natural Logarithm</i></b>				

Model A illustrates that the post 2001 period represented a level of Other large letter volume demand statistically significantly lower than previous periods and provided justification for developing a truncated model that is more reflective of more recent effects of electronic substitution.

The second phase of modelling then analysed this post 2001 period and highlighted the association with the level of economic activity whilst also generating a superior statistical fit than were the case when considering the entire timeframe.

Model B therefore reflects the final preferred forecasting model (inclusive of data to June 2008).

**Other Large Letter Volume Preferred Forecasting Model**  
(Holding the effects of electronic substitution constant)

**Model B: July 2001 – June 2008**

<b>Other Large Letter Volumes**#</b>		
Forecast model: July 2001 – June 2008		
1.195015291687	0.2235672391134	0.08120774073944
	Non-farm GDP**#	Closure of the Unbarcoded PreSort Service
<b><i>Explains 66.35% of the total quarterly variation in Other Large Letter Volumes</i></b>		
<b><i>*Denotes: Seasonally Adjusted Variable</i></b>		
<b><i>#Denotes: Natural Logarithm</i></b>		

**The Impact of Changes in Other Large Letter Prices**

Although a real price variable for Other large letters represented an important element within the testing process the variable failed to register any form of statistical significance within the final preferred model.

With two-thirds of the nominal price changes occurring in the first half of the considered timeframe, any associated demand impacts are likely to have been masked by the following overriding impacts:

- i) The high levels of electronic substitution that are assumed to have taken place with respect to the Other large letter volume segment (particularly during the pre-July 2001 period); &
- ii) The solid rates of economic growth experienced within the Australian economy.

Other large letter nominal price changes are however expected to emanate from Australia Post as per the recent price changes is important because evidence in the U.S. suggests the aggregated price elasticity of flat mail (the equivalent to total large letters in Australia) rests somewhere between 0.78 and 1.098.<sup>129</sup>

Diversified Specifics will continue to monitor Australian and international price elasticity estimates in future research undertakings.

<sup>129</sup> However it should be noted that differences in the transactional, social and promotional large letter mail mix between Australia and the United States could also be driving differences in resultant elasticity estimates.

### 4.3. LARGE LETTER VOLUME DRIVERS

Table 4.2.1 summarises the key descriptive summary statistics relevant to the preferred large letter forecasting models.

**Table 4.2.1**

Variables	Rolling 12 Month Growth Rate (Jun 07-Jun 08)	Average Annual Growth Rate (2000/01-2007/08)
<b>Elements of the Other Large Letter Volume Model</b>		
Other Large Letter Volumes	-1.71%	0.94%
Non-Farm Real GDP	3.63%	3.51%
<b>Elements of the PreSort Barcoded Large Letter Volume Model</b>		
PreSort Barcoded Large Letter Volumes	-0.49%	2.38%
Non-Farm Real GDP	3.63%	3.51%
Advertising Industry Health Measure	-34.92%	-4.28%

*Notes: The Rolling 12 month growth rate is calculated via a comparison of the commencement and concluding dates over the 12 month period.*

In 2007/08 both large letter segments experienced a volume decline despite registering a positive average annual growth rate for each across the entire 2000/01-2007/08 period.

These recent rates of decline may be explained in terms of the key drivers contained within in the econometric models:

- With respect to Other large letter volumes even though the level of economic activity (Non-farm) over the 2007/08 financial year (3.63%) was higher than the average annual growth rate experienced throughout recent years (3.51%) a declining rate of volume growth in 2007/08 is likely to be explained by underlying substitution effects factored out of the modelling process;
- PreSort Barcoded large letter volumes also declined in 2007/08 despite strong rates of economic growth. The health of the advertising industry however registered a fall of 34.92% (far greater than the average annual decline of 4.28% over the 2000/01-2007/08 period) suggesting a lower promotional component within the PreSort Barcoded large letter volumes and possibly explaining the more pronounced decline. In addition the recent annual report changes are likely to have exerted further downward pressures on this large letter product stream.

As stated in the projections section of this report, such downward trends in segmented large letter volumes are likely to continue as conditions in the domestic economy are expected to worsen in the short term.

#### 4.3.1 PRESORT BARCODED LARGE LETTER VOLUME DRIVERS

The PreSort Barcoded Large Letter model explains 89.4% of the total quarterly variation in PreSort Barcoded Large Letter volumes over the July 1995 to June 2008 timeframe.

The PreSort Barcoded Large Letter volume model has maintained an exceptional statistical fit in addition to a set of robust coefficients over time.

However, there is starting to emerge some narrowing of the unstandardised residual during the latter periods under consideration and these trends will be monitored in future updates to determine whether or not such a phenomenon is transitory or does necessitate an altering of the models scope.

Currently, formal residual testing on this model has not indicated any problematic outcomes for forecasting or explanatory purposes.

##### Market-based Volume Drivers & Elasticity Estimates<sup>130</sup>

Presented below are the historical (July 1995 to June 2008) demand drivers (ranked in order of explanatory potency) together with the relevant demand elasticity (where applicable).

##### 1. Real GDP (Non-farm):

PreSort Barcoded Large Letter volumes are related to business activity as evident by the positive statistically significant relationship between volumes and non-farm real GDP.

**Elasticity:** A 5% increase in Real non-farm GDP was associated with a 5.1% increase in PreSort Barcoded Large Letter volumes (0.1% less elastic than the March Quarter 2008 Update).

**Predictor Variable Recent Trend:** Non-farm real GDP has been growing at an annual average rate of 3.51% over the past seven years and by 3.63% in the 12 months prior to June 30, 2008.

##### 2. Advertising Industry Health Measure:

The health of the advertising industry continues to be a major explainer of PreSort Barcoded Large Letter volumes. At the segmented level, in the past the health of the advertising industry has been the most potent predictor of PreSort Promotional Large Letter volumes. This impact is also relevant for PreSort Barcoded Large Letter volumes in total.

**Elasticity:** A 5% increase in the Consumer Discretionary Index (i.e. the measure of health of the advertising industry) was associated with a 1.5% increase in PreSort Barcoded Large Letter volumes (Remains constant with March Quarter 2008 Update).

**Predictor Variable Recent Trend:** The Consumer Discretionary Index has fluctuated considerably since the start of 2000. Overall however, the index has increased at an annual average rate of 4.28% over the past seven years. It has decreased by 34.92% in the 12 months prior to June 30, 2008.

##### \* An additional driver (Seasonal – no ranking): Annual report dissemination

Whilst, the seasonal nature of annual report dissemination eliminates it from the models, per se, it should be noted that bulk mail-outs of annual reports occur in the month of October as a result of the legislative requirement for most publicly listed companies to lodge by September 30 of each year.

This effect is given by the seasonal factor which indicates PreSort Barcoded Large Letter volumes are, on average, 62% higher than the monthly average.

<sup>130</sup> All elasticities are estimated at their mean and are applicable only to the timeframe over which the econometric models have been developed. In interpreting the elasticities within this study, it is assumed all other factors are held constant.

## 4.3.2 OTHER LARGE LETTER VOLUME DRIVERS

The Other Large Letter model explains 66.4% of the total quarterly variation in Other Large Letter volumes over the July 2001 to June 2008 timeframe.

In Diversified Specifics recent investigation into establishing optimal timeframes for each of the Letters Group volume models the Other Large Letter product stream was favourably suited towards being modelled over a truncated timeframe than it had been in previous studies.

By focusing on associations since July 2001 (rather than from July 1995) the responsiveness of Other Large Letter volumes to changes in the level of economic growth appears to be more inelastic than previously thought (*See the elasticity in (1) below*).

### Market-based Volume Drivers & Elasticity Estimates

Presented below are the historical (September 2001 to June 2008) demand drivers (ranked in order of explanatory potency) together with the relevant demand elasticity (where applicable).

#### 1. Non-Farm Real GDP:

Other Large Letter volumes are hypothesised to predominantly consist of business-to-business mailings. As such, variations in volumes are explained to a statistically significant degree via the positive association that volumes have with economic activity i.e. Real GDP (Non-farm).

**Elasticity:** A 5% increase in the non-farm real GDP was associated with a 1.1% increase in Other Large Letter volumes (0.4% less elastic than the March Quarter 2008 Update when the timeframe extended back to July 1995).

**Predictor Variable Recent Trend:** Non-farm real GDP has been growing at an annual average rate of 3.51% over the past seven years and by 3.63% in the 12 months prior to June 30, 2008.

*The non-market based volume drivers have been excluded from this summary (refer to final models for greater detail).*

# APPENDIX A



### Internal Australia Post Data

Letters Group at Australia Post supplied all letter mail volume data to Diversified Specifics.

Volume data provided and analysed in this stage of the entire research project included:

- Domestic Other Large Letter Volumes; &
- Large Letter Delivery Performance;

### Externally Sourced Data

To facilitate association testing and the development of econometric models, Diversified Specifics obtained variables from various external sources. Each variable that was sourced and assessed is outlined in Table A.1.

Variables obtained were used to test developed hypothesis in an unbiased and structured manner.

Externally sourced variables outlined below that were not included in the final econometric models, were not found to be statistically significant in relation to segment-specific volumes.

**Table A.1**  
**Externally Sourced Data Descriptions**

Volume Predictor	Variable	Series Timeframe Utilised (Data Frequency)	Data Source
Australian Non-farm GDP	Australian Non-farm GDP	September 1995 to June 2008 – Quarterly series	Gross Domestic Product minus Agriculture, Forestry and Fishing (A), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Advertising Industry Health Measure	Media Index	September 1995 to June 2008 – Quarterly series	S&P/ASX 200 Consumer Discretionary Index, Standard and Poor's, <a href="http://www2.standardandpoors.com/portals/site/sp/en/au/page.topic/indices_asx200/2,3,2,8,8,19,2008,0,0,1,1,0,0,0,0.html">http://www2.standardandpoors.com/portals/site/sp/en/au/page.topic/indices_asx200/2,3,2,8,8,19,2008,0,0,1,1,0,0,0,0.html</a>
Real Price	Real Price of Other Large Letter Volumes	March 1985 to June 2008 – Quarterly series	A Chronology of Other Large Letter Nominal Price Changes: Letters Group, Australia Post; IPD: ABS Cat. No. 5206.0 Table 5. Expenditure on Gross Domestic Product (GDP), Australia: Implicit price deflators. Final Index created by Diversified Specifics.
Estimated Australian Population	Estimated Australian Population	September 1995 to September 2007 – Quarterly series	Estimated Resident Population (ERP), Cat. No. 3101.0 Table 1. Population Change, Summary - Australia ('000), Australian Bureau of Statistics
Large Letter Delivery Performance	Large Letter Delivery Performance	June 1998 to September 2007 – Monthly series	Letters Group, Australia Post



Volume Predictor	Variable	Series Timeframe Utilised (Data Frequency)	Data Source
Communications Industry GDP	Communication Industry GDP	September 1995 to June 2008 – Quarterly series	Communication services (J), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Finance and Insurance Industry GDP	Finance and Insurance Industry GDP	September 1995 to June 2008 – Quarterly series	Finance and insurance (K), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Government Administration and Defence Industry GDP	Government Administration and Defence Industry GDP	September 1995 to June 2008 – Quarterly series	Government administration and defence (M), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Property & Business Services Industry GDP	Property & Business Services Industry GDP	September 1995 to June 2008 – Quarterly series	Property and business services (L), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Retail Trade Industry GDP	Retail Trade Industry GDP	September 1995 to June 2008 – Quarterly series	Retail trade (G), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Personal and Other Services Industry GDP	Personal and Other Services Industry GDP	September 1995 to June 2008 – Quarterly series	Personal and other services (Q), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Cultural and Recreational Services Industry GDP	Cultural and Recreational Services Industry GDP	September 1995 to June 2008 – Quarterly series	Cultural and recreational services (P), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Wholesale Trade Industry GDP	Wholesale Trade Industry GDP	September 1995 to June 2008 – Quarterly series	Wholesale trade (F), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Health and Community Services Industry GDP	Health and Community Services Industry GDP	September 1995 to June 2008 – Quarterly series	Health and community services (O), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Education Industry GDP	Education Industry GDP Segment	September 1995 to June 2008 – Quarterly series	Education (N), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Real Price	Real Price of PreSort Barcode Large Letter	September 1995 to June 2008 – Quarterly series	PreSort Barcoded Letter Volumes and Revenues: Letters Group, Australia Post; IPD: ABS Cat. No. 5206.0 Table 5. Expenditure on Gross Domestic Product (GDP), Australia: Implicit price deflators
Paper as an Input Cost	Paper as an Input Cost (1) – Paper Stationery	September 1995 to June 2008 – Quarterly series	2411 Paper stationery, Table 10 and 11, Producer Price Index, Cat. Number 6427.0, Australian Bureau of Statistics

Volume Predictor	Variable	Series Timeframe Utilised (Data Frequency)	Data Source
Paper as an Input Cost	Paper as an Input Cost (2) – Printing & Services to Print	September 1995 to June 2008 – Quarterly series	2412 Printing & serv to print, Table 10 and 11, Producer Price Index, Cat. Number 6427.0, Australian Bureau of Statistics
Olympic Games	Olympic Games – Sydney Olympic Games	Dichotomous Variable - September 2000	Internally constructed Variable – Diversified Specifics
SARS	The Severe Acute Respiratory Syndrome (SARS)	Dichotomous Variable	Internally constructed Variable – Diversified Specifics
September 11	The September 11 Terrorist attacks	Dichotomous Variable	Internally constructed Variable – Diversified Specifics
Barcoding Introduction	Introduction of Barcoding Technology	Dichotomous Variable	Internally constructed Variable – Diversified Specifics
Unbarcoded PreSort Service and Go Mail Discontinuation	Unbarcoded PreSort Service and Go Mail Discontinuation	Dichotomous Variable	Internally constructed Variable – Diversified Specifics
Federal Elections	Federal Election	Dichotomous Variable	Australian Electoral Commission, <a href="http://www.aec.gov.au">http://www.aec.gov.au</a> , Internally constructed Variable – Diversified Specifics
State Elections	State Election	Dichotomous Variable	Australian Electoral Commission, <a href="http://www.aec.gov.au">http://www.aec.gov.au</a> , Internally constructed Variable – Diversified Specifics
Referendums	Referendum	Dichotomous Variable	Australian Electoral Commission, <a href="http://www.aec.gov.au">http://www.aec.gov.au</a> Internally constructed Variable – Diversified Specifics

# APPENDIX B



*Diversified Specifics standard statistical criteria, as applies to econometric models developed on behalf of all departments at Australia Post, is outlined in this section.*

Econometric modelling of associations amongst variables over a given timeframe represents the cornerstone of this research project.

Ordinary least squares (OLS) is the primary regression technique employed which seeks to estimate statistical associations such that the difference between the actual and predicted observations is kept to a minimum.

It is vital that such models (1) are developed in adherence to the general principles of statistical theory; and (2) exhibit a high level of utility.

This Appendix outlines the criteria utilised to determine a 'preferred' econometric model in this research project, in addition it highlights important caveats on employing these equations as the basis of inference.

### **Statistical Decision Criteria**

In accordance with statistical conventions, each of the preferred models must pass the following tests for adequacy:

1. Statistical diagnostic checks that assess the statistical integrity of each model, including (but not limited to) assessments of:
  - Goodness of fit measures - to ensure that an adequate proportion of variation in the dependant variable is explained by fluctuations in the combination of independent variables;
  - Analysis of variance information - to ensure the model possesses statistical utility; &
  - Random error tests - to ensure the required assumption governing the randomness of the error term is satisfied. This includes statistical tests for auto-correlation and heteroscedasticity.
2. The relationships indicated by the preferred models must reinforce hypothesised beliefs whilst also adhering to conventional economic theory. This 'commonsense test' implies all own-price effects should be negative and letter volumes should be positively associated with economic growth;
3. Model coefficients should be robust over a truncated portion of the dataset for all predictive models developed. The estimated parameters of the preferred equations must be suited to explaining a truncated (yet significant) portion of the data if a model were to be re-estimated. That is, the sub-equation should generate similar inferences to that of the preferred model; &
4. The variables utilised within the preferred model must also be explanatory in nature and possess the ability to contribute to managerial decision making at Australia Post. For example, a simple linear time trend whose statistical fit of a particular letter volume segment is quite high contributes nothing to advance Australia Post's understanding of economy specific demand drivers.

## **Important caveats when attempting to infer volumes using the preferred models**

Extreme caution is advised when utilising the econometric models and elasticities presented within this document as a basis of inference. Each of the following caveats on the analysis should be duly noted:

**1. The elasticity estimates are historical** implying the extent to which these estimates remain valid into the future depends upon how well the future replicates the past.

The historical data employed suggests all elasticity estimates generated by the preferred models are only a reflection of statistical associations detected over the examinable timeframe. Caution must therefore be applied when interpreting these estimates should the past be expected to provide a poor indication of future trends and associations.

**2. The preferred models may not contain every explanatory driver.**

It is reasonable to assume that other factors may cause letter volumes to fluctuate and the preferred models would, in turn, benefit from their inclusion.

Limitations in data availability impede the development of exhaustive models. Such models are impractical outside of theoretical environments.

Each model constructed throughout this research project was accompanied by a statistical measure that outlined the degree of volume fluctuation explained by the model.

A model explaining 100% of total variation would be considered exhaustive. In the real world, data restrictions prohibit the development of such an exhaustive model.

**3. An alternative frequency of data observations, for example the use of monthly as against quarterly data, may alter the inferences.**

A number of factors combined to determine the frequency of observations selected for each model, including:

- The results emanating out of statistical tests;
- The inertia of included variables over time; and
- Data availabilities.

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