

# Domestic Letter Segment Forecasts

2009/10 - 2011/12



: : :  
: : :  
: : :  
diversifiedspecifics

diversifiedspecifics

MARCH 2010

---

*prepared for*

**The Australian Postal Corporation**

111 Bourke Street  
MELBOURNE VIC 3000

t. +61 3 13 13 18  
w. [www.auspost.com.au](http://www.auspost.com.au)

---

*prepared by*

**Diversified Specifics Pty Ltd**

Aquavista Tower  
Suite 922, Level 9  
401 Docklands Drive  
DOCKLANDS VIC 3008

e. [askus@diversifiedspecifics.com.au](mailto:askus@diversifiedspecifics.com.au)  
w. [www.diversifiedspecifics.com.au](http://www.diversifiedspecifics.com.au)

ACN 096 063 295

Diversified Specifics Pty Ltd wish to thank management at Australia Post for their assistance in compiling this report. Mr. Mark Pollock, Mr. Alan Marshall & Mr. Mike Forster of Australia Post provided valuable insight and assistance with respect to theoretical beliefs regarding volume movements. Indeed, Mr. Hartmuth Scholz also supplied the internal data series utilised within this report.

Disclaimer: While every effort has been made to ensure the accuracy of this document, the uncertain nature of economic data, forecasting and analysis means that Diversified Specifics Pty Ltd is unable to make any warranties in relation to the information contained herein. Diversified Specifics Pty Ltd, its employees and agents disclaim liability for any loss or damage which may arise as a consequence of any person relying on the information contained within this document.



# TABLE OF CONTENTS

<b>1.0 INTRODUCTION</b>	<b>1</b>
1.1. PROJECT SCOPE	1
1.1. PROJECT SCOPE	2
1.2. THE VECM METHODOLOGY	5
<b>2.0 LETTER VOLUME TRENDS</b>	<b>8</b>
2.1. TOTAL LETTER VOLUMES	9
2.2. SMALL LETTER SEGMENT VOLUMES	13
2.3. SMALL LETTER SEASONALITY	16
2.4. LARGE LETTER SEGMENT VOLUMES	18
2.5. LARGE LETTER SEASONALITY	20
<b>3.0 LETTER VOLUME HYPOTHESES</b>	<b>23</b>
3.1. SMALL LETTER OVERVIEW	24
3.2. SMALL LETTER HYPOTHESES	26
3.3. LARGE LETTER OVERVIEW	31
3.4. LARGE LETTER HYPOTHESES	33
3.5. DATA TRENDS AND ISSUES	37
<b>4.0 MODEL DEVELOPMENT</b>	<b>48</b>
4.1. VECTOR ERROR CORRECTION MODELING	49
4.2. VECTOR ERROR CORRECTION COMPONENTS	50
4.3. FITS, DRIVERS AND ELASTICITIES	52
<b>5.0 EX-ANTE FORECASTS</b>	<b>55</b>
5.1 CAVEATS ON ECONOMETRIC FORECASTS	55
5.1 CAVEATS ON ECONOMETRIC FORECASTS	56
5.2 OTHER SL FORECAST SCENARIOS	57
5.2 PRESORT BARCODED SL FORECAST SCENARIOS	61
5.4 PRESORT BARCODED LL FORECAST SCENARIOS	66
<b>APPENDIX A</b>	<b>69</b>
DATA & DATA DESCRIPTIONS	70
<b>APPENDIX B</b>	<b>73</b>
KEY STATISTICAL OUTPUTS	74

# 1.0 INTRODUCTION



### 1.1.1 Introduction

Over the course of the last decade Diversified Specifics has undertaken a large body of research on behalf of Australia Post in its attempts to establish the determinants of domestic small and large letter volume fluctuations within Australia since 1995/96.<sup>1</sup>

A common objective in these research undertakings was to explore the statistical validity of the hypothetical assumptions underlying the factors driving domestic segmented letter volumes and then provide some explanatory insight aimed at informing Australia Post management decision making.

The research findings in general generated a series of econometric<sup>2</sup> models although also acknowledged statistical evidence of an increasingly dynamic postal landscape characterised by the combined effects of substitution, consolidation and rationalisation.

Given the econometric models were a statistical summary premised upon historical associations the degree to which they could capture these emerging effects remained questionable.

Compounding the difficulties presented by these emerging trends was the onset of the global financial crisis (GFC) whereby many forecasting institutions engaged in constant revisions to their forward estimates of a key letter volume driver - Australian Gross Domestic Product (GDP).

As the level of economic activity fell below the lower bound over which the models had been developed the estimated elasticities emanating from the econometric analysis lost a degree of practical applicability.

That is, the available empirical observations provided no insight into how letter volumes would respond to exceedingly low levels of GDP growth.

The complexities of these combined effects meant that the research undertaken was intended only as an indicative guide to how letter volumes would fluctuate under a limited set of conditions and whilst this provided some explanatory insight the logical extension to letter volume forecasts were not considered feasible.

---

<sup>1</sup> The three most recent publicly available reports are: 1) 'Domestic Small Letter Segment Volume Demand', December 2007; 2) 'Domestic Large Letter Segment Volume Demand' February 2009; and 3) 'Domestic Small Letter Segment Volume Demand Addendum', March 2009, all produced by Diversified Specifics and commissioned by Australia Post.

<sup>2</sup> Econometric techniques in this context implies historical domestic letter volume data is related to a number of independent variables with statistical tests determining a set of preferred explanatory equations.

Although such difficulties did exist the Australian Competition and Consumer Commission (ACCC) expressed concern that Australia Posts letter volume forecasts were not built around a quantitative baseline as evident by the following comments:

In December 2009:

*“Australia Post has not provided evidence that its volume forecasts are based on a robust methodology that incorporates these relevant (demand) factors and studies in an appropriate manner.”<sup>3</sup>*

Consequently, Australia Post have commissioned Diversified Specifics to develop a set of robust econometric short run forecasts that are intended to act as a baseline over which further market intelligence may be overlaid in future letter volume demand updates.

Upon completion, this document was submitted to international industry experts and respected external econometricians to ensure the research undertaking conducted by Diversified Specifics represented world’s best practice methodologically and econometrically in the field of postal demand analysis.<sup>4</sup>

---

<sup>3</sup> ACCC, Australia Post’s Draft 2009 Price Notification - ACCC View, Public version, December 2009, p.51

<sup>4</sup>Diversified Specifics would like to thank the following for their comments, feedback and review: Michael Crew (CRRl Professor of Regulatory Economics, Rutgers University); Paul Kleindorfer (Paul Dubrule Professor of Sustainable Development, INSEAD); Matthew Harding (Assistant Professor of Economics, Stanford University); & Vance Martin (Professor of Economics, University of Melbourne). Written testimonials in support of these reviews are available from Diversified Specifics. Whilst reviews and suggestions were obtained any errors are wholly attributable to Diversified Specifics.

### 1.1.2 Objectives

The objective set pertaining to this research undertaking is as follows:

- Generate a series of segmented short run letter volume *ex-ante* forecasts utilising appropriate statistical techniques. This will require a progression from static Ordinary Least Squares (OLS) techniques to a dynamic Vector Error Correction Model (VECM) framework;
- Present these *ex-ante* forecasts as a baseline only by accepting that in recent times there has been a high level of dynamism surrounding segmented letter volume fluctuations<sup>5</sup> combined with uncertainty as relates to lasting effects of the GFC;
- Revisit the hypothetical assumptions underlying the factors driving domestic segmented small letter volumes within Australia over recent times;
- Source, collect, transform and generate (where required) the relevant data required in the construction of the *ex-ante* forecasting models inclusive of observations to June 2009;
- Specify forecasts under two alternative conditions on the drivers: endogenous (all variable projections determined within the system of equations over the forecast period) and exogenous (incorporate projections on the drivers over the forecast period);
- Undertake the above econometric research in a manner that facilitates future comparisons in the absence of significant structural changes;
- Conduct preliminary investigations into how the segmented short run letter volume econometric baseline can be augmented by market intelligence and very recent trends to add increasing relevance to the *ex-ante* forecasts; &
- Produce summary documentation to be utilised internally at Australia Post to assist in policy formulation and the development of managerial reports.

---

<sup>5</sup> Due to the combined effects of substitution, consolidation and rationalisation practices amongst mailing agents.

### 1.2.1 Vector Error Correction Models

The vector error correction model (VECM) provides a general and flexible framework in which to capture the dynamics of letter volume fluctuations. The key feature underpinning this class of models is that it decomposes postal volumes in terms of long run and short run behaviour.

This contrasts with the static Ordinary Least Squares (OLS) model which essentially focuses on the long run behaviour. From a forecasting perspective whilst capturing long run dynamics provides the overall direction of the underlying series the OLS models fail to capture the short run dynamics by construction as distinct from the VECM.

This VECM framework rests on the current threshold of statistical analysis representing the most advanced techniques in econometrics aimed at modelling dynamic processes within the economy.

A further advantage of this framework is that whilst baseline forecasts are generated assuming that all variables in the system are allowed to interact with each other (i.e are endogenous) it is also possible to enhance these forecasts by making particular assumptions on some of the key drivers of letter volumes. This allows the *ex-ante* forecasts to benefit from further insight into the likely future movements in the drivers.

Moreover, as the VECM model subsumes the static model in this research all interpretations will tend to focus on the VECM within this documentation.



## 1.2.2 Econometric testing and analysis

The structure of this document, in line with the methodological approach to generating the *ex-ante* forecasts is as follows:

**1. Observe the recent trends in segmented letter volumes via graphical, tabular and numerical descriptive summary measures.**

This initial step permits Australia Post and Diversified Specifics to identify and discuss any abnormal trends or outliers since the most recent study and is outlined in Section 2 of this document. Seasonal analysis including seasonal factor generation and the de-seasonalisation of variables is also presented in this section.

**2. Develop in consultation with Australia Post a diverse and extensive set of hypotheses and potential drivers that are feasibly testable via econometric techniques.**

This includes sourcing, collecting and developing tractable data sets aimed at facilitating hypotheses testing. The results of this undertaking are presented in Section 3 of this document. Graphical benchmarking of each potential driver against the relevant letter volume segment is outlined in an accompanying supplementary document provided to Australia Post.

**3. Establish the appropriate commencement date for each letter volume segment.**

This is undertaken utilising structural break testing and whilst a statistical summary of these tests has been provided to Australia Post they will not be specifically discussed in this documentation for the purpose of conciseness.

**4. Develop the models as a system of equations with a forecasting objective.**

Vector Error Correction Modelling (VECM) represents the principle econometric technique utilised in this undertaking. The process of model development however does employ non-linear Ordinary Least Squares (OLS) estimation techniques initially to identify a long run association. Logical extensions to the existing long-run models (from previous studies) are investigated taking advantage of an extended set of data observations. The associations must reinforce hypothesised beliefs whilst also adhering to conventional economic theory. This 'commonsense test' implies all long run own-price effects should be negative and letter volumes should be positively associated with economic growth. The methodological approach adopted sought to utilise the most up-to-date set of information on establishing the long run OLS models. Hence the timeframe for their development extends to 2009Q3. However, to conform with the requirement of *ex-ante* forecasts on a financial year basis the subsequent development of the vector error correction models are developed utilising data until 2009Q2.

Once a preferred long run model has been selected all member variables are then checked for non-stationarity via a series of unit root checks and ultimately cointegration. A VECM is then derived and subjected to a battery of robustness checks to determine its lag structure in addition to examining its properties under differing specifications (with or without a time trend and intercept). *Ex-post* forecasting assessments of the Root Mean Square Error (RMSE) then resolve the preferred VECM in the cases where a number of candidate models remain from the aforementioned tests. Comprehensive statistical outputs summarising the above activities have been supplied to Australia Post with the preferred OLS and VECM EViews statistical outputs replicated in Appendix B of this document. Section 4 provides an extended interpretation of the prevailing econometric models and gives the elasticities practical application.

**5. Generate a series of ex-ante forecasts under a variety of scenarios and treatments on the drivers.**

The letter volume drivers may be classified as either exogenous or endogenous. With those variables treated as exogenous (determined outside the system) it is essential that credible and timely projections from recognised institutional bodies provide the theoretical underpinnings governing their future fluctuations. Diversified Specifics and Australia Post have sourced a variety of projections on a number of drivers and developed a robust set of projections utilised in the *ex-ante* forecasting process. Variables that are inherently volatile such as those measuring the health of the advertising industry are built around scenario testing to illustrate the sensitivities of the *ex-ante* letter volume forecasts to differing driver projections.

Via the system of equations it is also possible to endogenise (determine within the system) all or some of the letter volume drivers. Projecting the substitutive effects for the Other small letter volume segment provides an example whereby projections on the level of economic activity (treated as exogenous) is utilised to assist in the generation of the projected values on credit card growth (treated as endogenous). A summary of the *ex-ante* forecasts are presented in Section 5 of this document.

**6. Although not specifically addressed in this research undertaking, it is essential that any interpretation of the letter volume forecasts generated via econometric methods be augmented by further internal and market-based intelligence where possible.**

This is particularly important for letter volume forecasts as the combined effects of substitution, consolidation and rationalisation are likely to create an increasingly dynamic postal landscape in future years. Further research in this area should therefore attempt to overlay additional intelligence (where available) on the baseline econometric *ex-ante* forecasts to add an increasing realism to the numbers.

For the statistical component of this analysis a complete record of all data sets, lead-in tests, diagnostics, model variations and forecast assessments has been retained for reference purposes.

2.0 LETTER VOLUME TRENDS



## 2.1. TOTAL LETTER VOLUMES

Total Letter volumes consist of all domestic letters sent and received within Australia for both the Small Letter and Large Letter volume segments.

Over the past thirteen years (i.e. from 1995/96 to 2008/09), Total Small Letter volumes has declined on an annual basis on only two occasions.

One of those two annual declines was experienced in the most recent financial year. Specifically, contrary to the overall historical volume trend since 1995/96, Total Small Letter volumes fell by 3.8% in 2008/09.

This decline reflects the single largest annual decline in Total Small Letter volumes over the period for which quarterly data is available.

Total Large Letter volumes fluctuates to a significantly greater extent than Total Small Letter volumes. As evident in Table 2.1.1, the two most recent financial years (2007/08 and 2008/09) have experienced successive annual declines with the latter of these two years witnessing a deterioration of almost 7%.

Since 1995/96, annual growth in Total Large Letter volumes has moved in waves i.e. four years of positive annual growth, followed by three years of negative annual growth, followed by four more years of positive annual growth and finally two years of negative annual growth.

**Chart 2.1.1**

**Total Small Letter Volumes vs. Total Large Letter Volumes**  
1995/96 - 2008/09 (Financial Year)

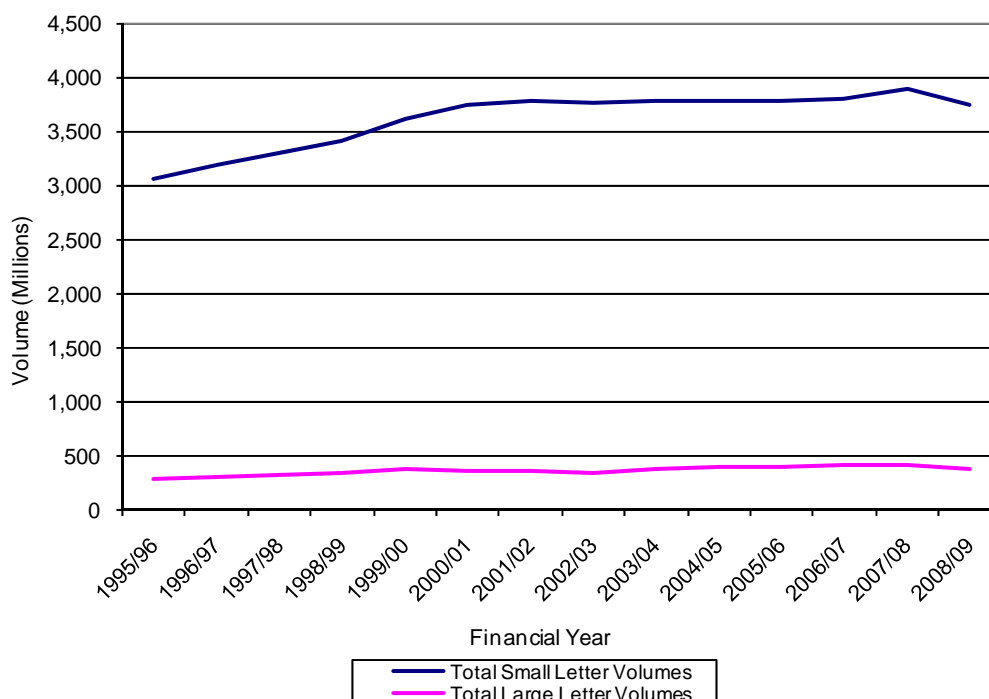


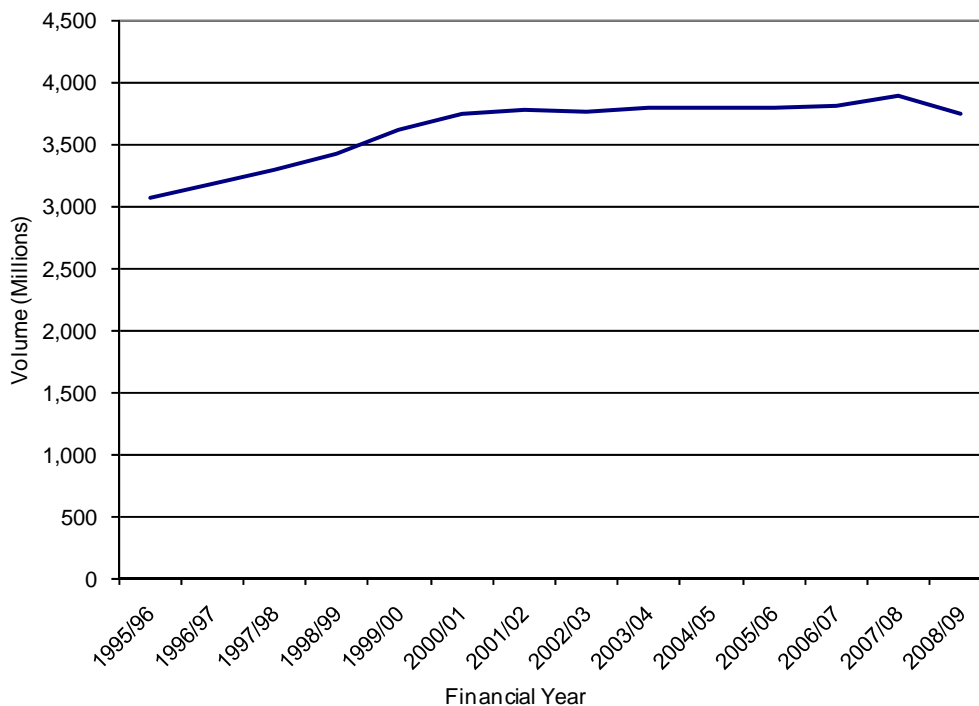
Chart 2.1.2 demonstrates three distinctive patterns in Total Small Letter volumes although the third phase is in its infancy. Specifically, Total Small Letter volumes:

- Increased annually from 1995/96 to 2001/02;
- Stagnated thereafter to 2006/07; &
- Decreased sharply in 2008/09.

The one exception to this summary occurred in 2007/08 where Total Small Letter volumes grew by 2.3%.

**Chart 2.1.2**

**Total Small Letter Volumes**  
1995/96 - 2008/09 (Financial Year)



Despite fluctuating throughout the period from 1995/96 to 2008/09, Total Large Letter volumes have trended upwards overall as illustrated in Chart 2.1.3. The pattern of upward movement however, has followed a path of successive waves of positive and negative annual growth.

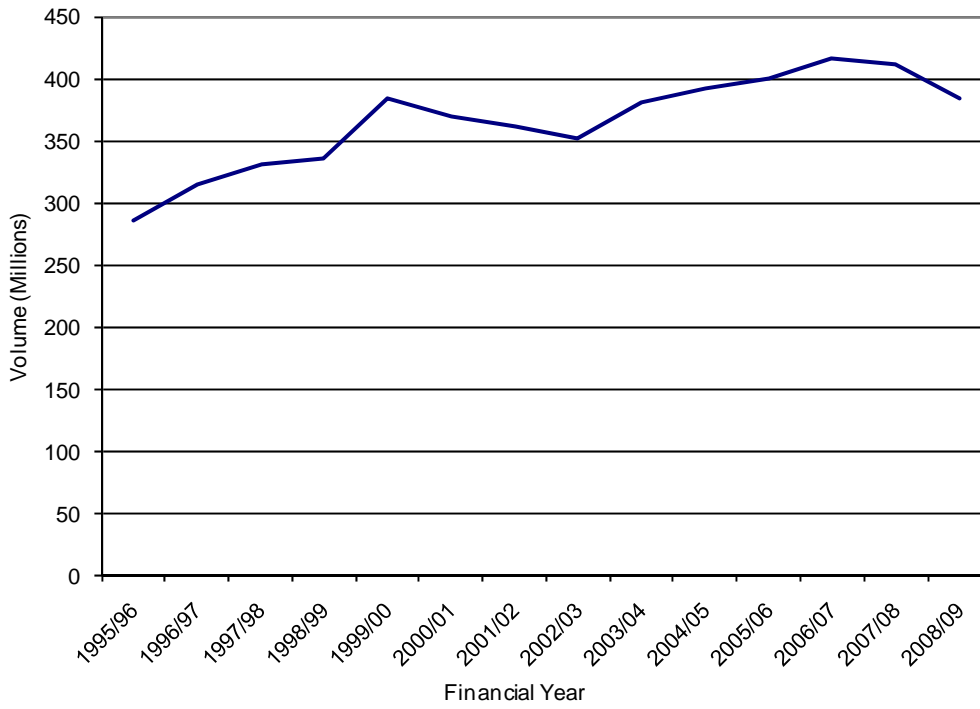
Specifically, since 1995/96, annual growth in Total Large Letter volumes has oscillated according to the following pattern:

- **Wave I:** Four years of positive annual growth (1995/96 – 1999/00);
- **Wave II:** Three years of negative annual growth (2000/01 – 2002/03);
- **Wave III:** Four more years of positive annual growth (2003/04 – 2006/07); and
- **Wave IV:** Two years of negative annual growth, which may not have concluded (2007/08 – 2008/09).

Importantly, the most recent financial year (i.e. 2008/09) witnessed the largest annual growth decline over the examined timeframe (almost 7%). This decline was three percentage points higher than the next largest annual decline experienced since 1995/96.

**Chart 2.1.3**

**Total Large Letter Volumes**  
1995/96 - 2008/09 (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%
2008/09	-3.80%	-6.67%

Whilst Total Large Letter volumes have fluctuated in the four waves detailed above since 1995/96, Total Small Letter volumes have tended to be more stable, declining only twice on an annual growth basis throughout the examined timeframe.

A striking similarity however, between Total Small Letter volumes and Total Large Letter volumes is that both segments experienced their single largest annual growth rate decline, in the most recent financial year.

The global financial crisis and ensuing slowdown in the Australian economy is purported to be a significant factor associated with this decline.

## 2.2. SMALL LETTER SEGMENT VOLUMES

---

Total Small Letters is comprised of two components: 1) The Other Small Letter volumes segment<sup>6</sup>; and 2) The PreSort Barcoded Small Letter volumes segment.<sup>7</sup> Since 1995/96 there has been a considerable and fundamental contrast in the volume trends amongst each of these two letter volume segments.

Whilst PreSort Barcoded Small Letter volumes have exhibited an upward overall trend since 1995/96, Other Small Letter volumes have generally been in decline. Over the 1995/96 to 2008/09 period, Other Small Letter volumes have declined on an annual basis on nine of the thirteen years.

The Other Small Letter volumes segment has been in annual decline for the past six successive years. Notably, the most recent financial year saw the largest annual volume decline over the examinable timeframe, down by more than 7%.

Conversely, PreSort Barcoded Small Letter volumes have only returned negative annual growth on two occasions in the past thirteen years, the most recent occurring in the 2008/09 year. Given its transactional and promotional based characteristics the slowdown in the Australian economy has been a significant factor associated with this decline.

Chart 2.2.1 illustrates financial year volumes for both Other Small Letter volumes and PreSort Barcoded Small Letter volumes over the 1995/96 to 2008/09 period.

The initial time periods demonstrate that Other Small Letters dominate Total Small Letter volumes. The contrasting trends in each segment however, results in a reversal of the segment shares i.e. PreSort Barcoded Small Letters becomes the dominant segment from 2005/06 onwards. The annual contrast in volumes for both segments is additionally summarised in Table 2.2.1.

Indeed, as will be illustrated later in this document, if non-market explainers are controlled for (such as Australia Post product changes that have artificially migrated small letter volumes between segments at certain times) then the general shift becomes more pronounced.<sup>8</sup>

Moreover, to provide initial insight into the association (or lack thereof) between both letter mail segments and economic activity, the annual growth rates in Australian Non-farm GDP are also presented.

---

<sup>6</sup> The 'Other Small Letter' volume segment consists of full rate business mail, cheque payments and other consumer correspondence that satisfy the relevant small letter category size and weight requirements; the major products categories are Ordinary Letters and Clean Mail.

<sup>7</sup> The 'PreSort Barcoded Small Letter' volume segment consists of bulk (300+) lodgements of 1) Business transactional letter volumes such as bills, statements, share notices and letters advising customers of price increases, policy changes, etc; & 2) Direct mail including promotional letters, brochures and other addressed promotional material that satisfies the relevant small letter category size and weight requirements. The dominant category within this segment is PreSort Transactional Letters.

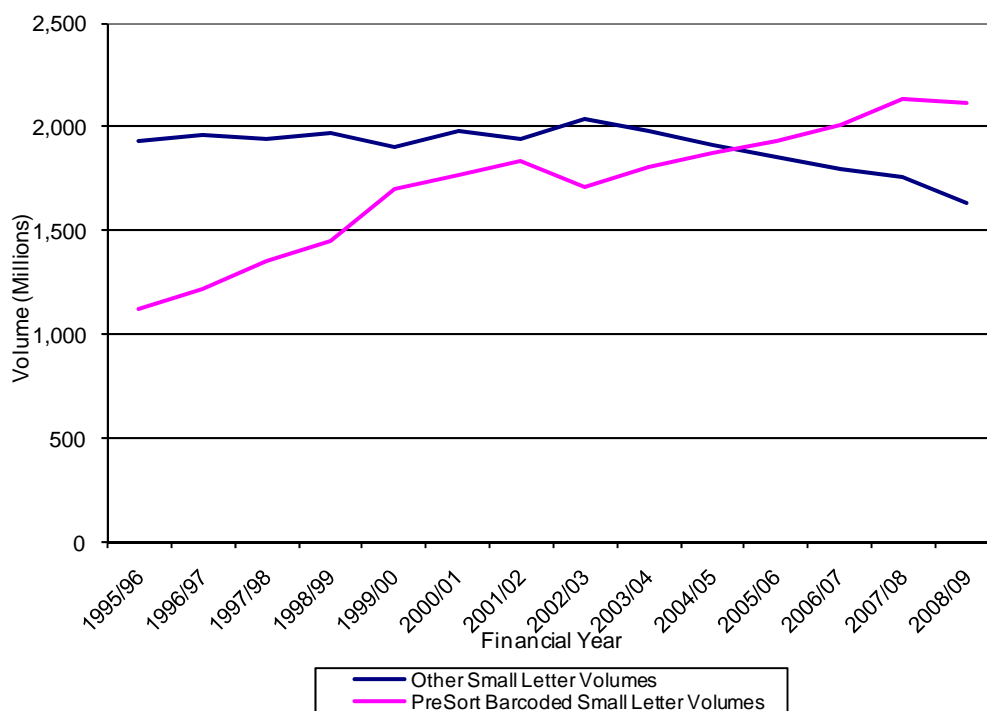
<sup>8</sup> An example of which is the closure of the unbarcoded PreSort service that saw a proportion of volumes formerly contained within the PreSort letter volume segment become ineligible for bulk lodgement and subsequently migrating across to the Other letter volume segment.



**Chart 2.2.1**

**Other Small Letter Volumes vs. PreSort Barcoded Small Letter Volumes**

1995/96 - 2008/09 (Financial Year)



**Table 2.2.1**

Year	Other Small Letter Segment Volume Growth	PreSort Barcoded Small Letter Segment Volume Growth	Australian Non-farm GDP Growth
1995/96	-	-	-
1996/97	1.62%	7.97%	3.78%
1997/98	-1.08%	11.25%	4.55%
1998/99	1.30%	6.85%	5.04%
1999/00	-3.20%	17.75%	3.88%
2000/01	3.89%	3.74%	1.93%
2001/02	-2.03%	3.68%	3.86%
2002/03	5.19%	-6.45%	3.89%
2003/04	-2.93%	5.23%	3.66%
2004/05	-3.41%	3.82%	2.81%
2005/06	-2.93%	3.02%	3.08%
2006/07	-3.45%	4.21%	4.30%
2007/08	-2.08%	6.15%	3.66%
2008/09	-7.12%	-1.07%	0.79%

At this stage two important observations require noting:

**1. Other Small Letters and its association with GDP**

Since 1995/96 the dominant driver of Other Small Letter volumes has tended to be substitutive pressures attributable to a declining propensity of mailing agents to utilise the traditional mail item for bill payments. Although this impact has tended to crowd out the effects of other potential drivers the recent global financial crisis (GFC) is likely to explain the large 2008/09 decline. Prior to this economic downturn no observations were available to examine how Other Small Letter volumes would react to a weak domestic economy.

Moreover, future observations on the segment require monitoring to establish whether or not the GFC not only reduced Other Small Letter volume demand but has acted as a catalyst for mailing agents to engage in increased movements away from the traditional mail item as they are forced into rationalising their cost bases even further. Therefore this and future statistical investigations into the effects of the GFC should not only attempt to assess a structural break in the data resulting in a permanent downward volume shift but also seek to establish an accelerated movement towards substitutive alternatives.

**2. Increasing threats to PreSort Barcoded Small letter volumes**

Although movements in PreSort Barcoded Small letter volumes have tended to be aligned to fluctuations in the level of domestic economic activity since 1995/96 a behavioural change amongst the major mailers would significantly threaten this association. That is, should the increasing rates of small letter rationalisation and consolidation be accompanied by a sustained growth in electronic substitutive practices on the bill presentment side of a transaction then PreSort Barcoded Small letter volumes would be exposed to a significant downside threat regardless of the level of economic activity.

Both of the above observations constitute an important acknowledgement of the dynamics and uncertainty surrounding Total Small Letter volumes and require monitoring in future updates.

## 2.3. SMALL LETTER SEASONALITY

Seasonal decomposition of each letter segment enables the identification of peaks and troughs within each year. Seasonal factors, resulting from the decomposition process, facilitate volume comparisons for specific periods of interest against the average within that year.

Both PreSort Barcoded Small Letter volumes and Other Small Letter volumes exhibit pronounced seasonal patterns. Other Small Letter volumes however, exhibit more seasonality when comparing both segments.

The quarterly seasonal factors over the July 1995 to June 2009 timeframe for each of the small letter segments are outlined in Tables 2.3.1.

**Table 2.3.1**

Domestic Small letters		
Quarterly Seasonal Factors		
Quarter	Other	PreSort Barcoded
<b>Mar</b>	90.33%	96.39%
<b>Jun</b>	94.86%	98.74%
<b>Sep</b>	100.62%	102.68%
<b>Dec</b>	114.20%	102.19%

This suggests, the December quarter seasonal factor for Other Small Letter volumes suggests that volumes in this quarter are 14.2% higher than the average quarterly volume.

The equivalent seasonal factor for PreSort Barcoded Small Letter volumes implies volumes in this quarter are only 2.2% higher than the average quarterly volume.

Monthly seasonal variation can provide further insight regarding the seasonal patterns per letter volume segment. Table 2.3.2 highlights the marked differences in monthly seasonal factors for each letter volume segment.

Key insights include:

- Other Small Letter volumes are 31.4% higher in the month of December when compared to the monthly average; whilst
- PreSort Barcoded Small Letter volumes are 11.4% lower in the month of December when contrasted to the monthly average.

**Table 2.3.2**

<b>Domestic Small letters</b>		
<b>Monthly Seasonal Factors</b>		
<b>Month</b>	<b>Other</b>	<b>PreSort Barcoded</b>
<b>Jan</b>	84.21%	92.08%
<b>Feb</b>	90.54%	93.26%
<b>Mar</b>	96.23%	103.75%
<b>Apr</b>	89.32%	92.74%
<b>May</b>	98.87%	105.40%
<b>Jun</b>	96.24%	97.91%
<b>Jul</b>	103.27%	109.00%
<b>Aug</b>	100.87%	101.43%
<b>Sep</b>	97.74%	97.84%
<b>Oct</b>	101.59%	108.55%
<b>Nov</b>	109.68%	109.38%
<b>Dec</b>	131.43%	88.66%

## 2.4. LARGE LETTER SEGMENT VOLUMES

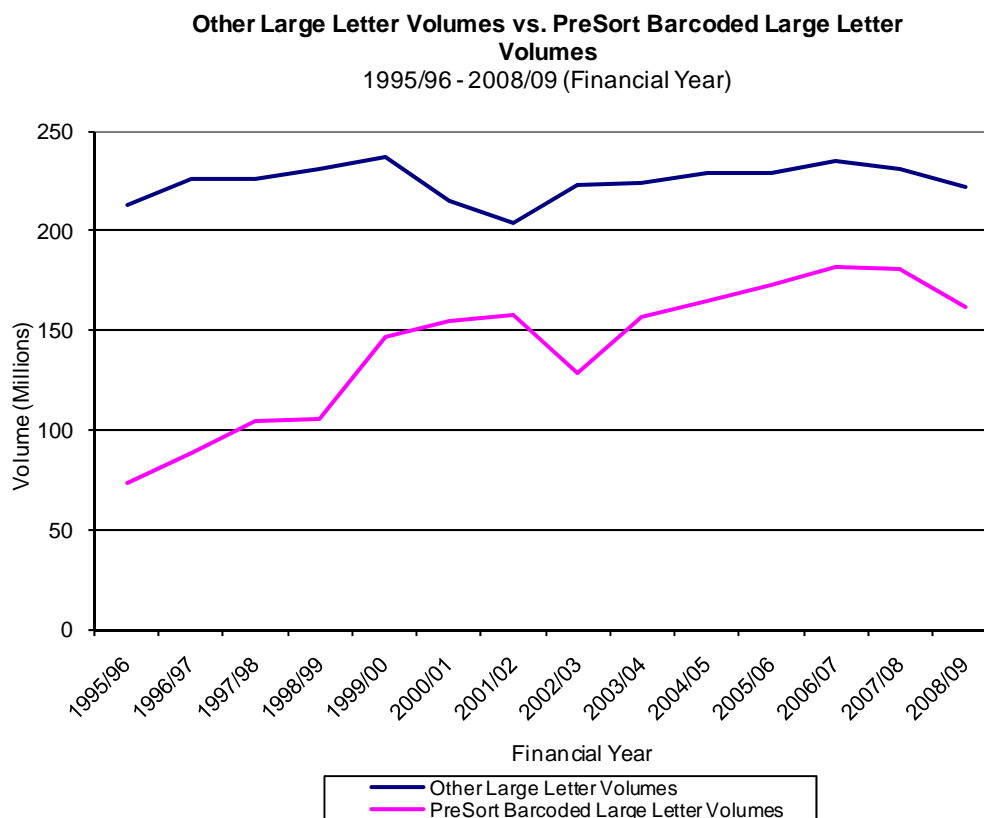
Similar to the Small Letter category Large Letter volumes have generally trended upwards since 1995/96. Within this segment, Other Large Letter volumes<sup>9</sup> have decreased on an annual growth basis on five of the past thirteen years.

Conversely, PreSort Barcoded Large Letter volumes<sup>10</sup> have experienced an annual decline on only three occasions over the same timeframe.

Moreover, the one-off occurrence in 2002/03 where growth in Other Large Letter volumes was positive whilst PreSort Barcoded Large Letter volumes declined substantially was an aberration caused by Australia Post product lodgement changes (i.e. closure of the Unbarcoded PreSort service) rather than by natural market forces.

The opposing volume growth trends in both product segments, has resulted in a narrowing of the volume gap between both segments as depicted in Chart 2.4.1.

**Chart 2.4.1**



<sup>9</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>10</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.

**Table 2.4.1**

Year	Other Large Letter Segment Volume Growth	PreSort Barcoded Large Letter Segment Volume Growth	Australian Non-farm GDP Volume Growth
1995/96	-	-	-
1996/97	6.02%	20.18%	3.78%
1997/98	0.17%	18.49%	4.55%
1998/99	2.05%	0.15%	5.04%
1999/00	2.64%	39.54%	3.88%
2000/01	-9.36%	5.41%	1.93%
2001/02	-4.94%	2.17%	3.86%
2002/03	9.38%	-18.47%	3.89%
2003/04	0.56%	21.64%	3.66%
2004/05	1.88%	4.89%	2.81%
2005/06	-0.05%	4.92%	3.08%
2006/07	2.76%	5.24%	4.30%
2007/08	-1.74%	-0.44%	3.66%
2008/09	-3.68%	-10.49%	0.79%

Table 2.4.1 also illustrates the impact of the global financial crisis (GFC) on the large letter volume segment. PreSort Barcoded Large Letter was particularly affected by the economic downturn registering a 10.49% annual rate of decline in 2008/09.

Similarly to the small letter segment volumes prior to the GFC no tractable observations since 1995/96 provided any insight into how Large Letter volumes would react to a weakened domestic economy.

Again, questions exist as to whether or not the GFC not only reduced Large Letter volumes via a single downward shift or additionally acted as a catalyst for a new wave of substitution away from the traditional mail item.

As the effects of the GFC become increasingly observable over time future updates will be better placed to recognise, identify and quantify the ongoing volume impacts.

## 2.5. LARGE LETTER SEASONALITY

The quarterly seasonal factors for each of the large letter segments over the July 1995 to June 2009 timeframe are summarised in Table 2.5.1.

The quarterly seasonal factors for Other Large Letter volumes suggest the following:

- Volumes in March quarter are typically 9.4% lower than the quarterly average volume;
- Volumes in the June quarter are typically 2.2% lower than the quarterly average volume;
- Volumes in the September quarter are typically 4.7% higher than the quarterly average volume; &
- Volumes in the December quarter are typically 6.9% higher than the quarterly average volume.

Similarly, the quarterly seasonal factors for PreSort Barcoded Large Letter volumes suggest the following:

- Volumes in March quarter are typically 16.0% lower than the quarterly average volume;
- Volumes in the June quarter are typically 7.7% lower than the quarterly average volume;
- Volumes in the September quarter are typically 2.6% higher than the quarterly average volume; &
- Volumes in the December quarter are typically 21.1% higher than the quarterly average volume.

**Table 2.5.1**

<b>Domestic Large Letters</b>		
<b>Quarterly Seasonal Factors</b>		
<b>Quarter</b>	<b>Other</b>	<b>PreSort Barcoded</b>
<b>Mar</b>	90.61%	84.00%
<b>Jun</b>	97.78%	92.33%
<b>Sep</b>	104.71%	102.60%
<b>Dec</b>	106.89%	121.07%

The equivalent monthly seasonal factors for each of the large letter segments over the July 1995 to June 2009 timeframe are summarised in Table 2.5.2.

**Table 2.5.2**

<b>Domestic Large letters</b>		
<b>Monthly Seasonal Factors</b>		
<b>Month</b>	<b>Other</b>	<b>PreSort Barcoded</b>
<b>Jan</b>	79.07%	64.72%
<b>Feb</b>	93.74%	84.38%
<b>Mar</b>	98.98%	103.10%
<b>Apr</b>	90.08%	89.54%
<b>May</b>	103.93%	93.45%
<b>Jun</b>	99.28%	93.58%
<b>Jul</b>	104.17%	84.75%
<b>Aug</b>	104.81%	95.30%
<b>Sep</b>	105.19%	127.81%
<b>Oct</b>	109.34%	160.53%
<b>Nov</b>	107.58%	118.81%
<b>Dec</b>	103.82%	84.02%

### **The Annual Report Effect**

The Corporations Legislation Amendment (Simpler Regulatory System) Act 2007<sup>11</sup>, received Royal Assent on 28 June 2007, and preliminary evidence suggests the volume of company annual reports mailed directly to eligible members has declined as a consequence.

This impact is illustrated by the seasonal factors in Table 2.5.3 which highlights reducing PreSort Barcoded large letter volumes as senders shift towards electronic annual report alternatives rather than electing to receive the hardcopy equivalents.<sup>12</sup>

To assess this through quantitative techniques two sets of seasonal factors have been developed and are presented in Table 2.5.3.

When contrasting the July 2001 - June 2005 seasonal factors with those of July 2005/June 2009 the impact of the legislation on PreSort Barcoded large letter volumes is immediately evident.

The October quarter seasonal factors have decreased in this latter period (contrast the October figures of 165.78% with 153.80% in Table 2.5.3).

Moreover, the July 2005 - June 2009 seasonal factors are likely to significantly underestimate the volume decline as it contains only two years (out of the four) of data subsequent to the legislation taking effect.

<sup>11</sup> The Parliament of Australia, Corporations Legislation Amendment (Simpler Regulatory System) Act 2007, No. 101, 2007, Weblink: <http://www.comlaw.gov.au/comlaw/Legislation/Act1.nsf/0/2047C44C7D3BD6DFCA25730D001E10C2?OpenDocument>

<sup>12</sup> The Act compels companies to mail annual reports to shareholders only when they nominate to receive them via the post.



**Table 2.5.3: Seasonal Factors**

Monthly Seasonal Factors		
Month	PreSort Barcoded Large Letter Volumes	
	Jul 01 - Jun 05	Jul 05 - Jun 09
<b>Jan</b>	69.07%	67.09%
<b>Feb</b>	88.00%	82.35%
<b>Mar</b>	102.16%	100.51%
<b>Apr</b>	87.95%	89.37%
<b>May</b>	93.64%	89.24%
<b>Jun</b>	90.33%	91.94%
<b>Jul</b>	77.75%	81.72%
<b>Aug</b>	76.71%	104.14%
<b>Sep</b>	144.89%	134.52%
<b>Oct</b>	165.78%	153.80%
<b>Nov</b>	117.68%	118.42%
<b>Dec</b>	86.04%	86.88%

Table 2.5.4 & 2.5.5 illustrates the transformation that has occurred within this latter period as the volume growth rate decline in PreSort Barcoded Large Letter volumes began to respond to the legislative change towards the end of the 2005/06-2008/09 period. This is explained in large part by a substantial turnaround in October and November volumes.

**Table 2.5.4: Year on Year Growth Rates (2005/06-2008/09)**

Year	PreSort Barcoded Large Letter Volumes (A)	% Change in (A)	October % Change (Year on Year)
2008/09	161.6009	-10.5%	-17.2%
2007/08	180.5463	-0.4%	-0.6%
2006/07	181.3518	5.2%	21.0%
2005/06	172.3205		

**Table 2.5.5: Year on Year Growth Rates (2005/06-2008/09)**

Year	PreSort Barcoded Large Letter Volumes (A)	% Change in (A)	November % Change (Year on Year)
2008/09	161.6009	-10.5%	-18.87%
2007/08	180.5463	-0.4%	-10.25%
2006/07	181.3518	5.2%	5.66%
2005/06	172.3205		

Indeed, the seasonal adjustment that occurs within the econometric forecasts would tend to underestimate the annual report decline to an even greater degree than is highlighted above as the seasonal factor employed is a function of the entire timeframe rather than an exact measurement of this recent trend.

To add increasing relevance, further research could aim to quantify then overlay these annual report effects on to the prevailing *ex-ante* baseline forecasts derived via the econometric models.

## 3.0 LETTER VOLUME HYPOTHESES



### 3.1. SMALL LETTER OVERVIEW

Diversified Specifics has statistically assessed a diverse set of potential explanatory demand drivers related to both Other Small Letter volumes and PreSort Barcoded Small Letter volumes.

The development of a diverse and extensive set of potential explanatory variables, emanated from detailed in-depth discussions held between Australia Post management and Diversified Specifics over the past ten years.

Moreover, trends in international postal markets as well as rational economic theory were also key determinants in the formation of the research hypotheses.

Each of the assessed potential explanatory variables is listed in this section. Moreover, the explanatory variables presented in Table 3.1.1 and Table 3.1.2 are categorised in accordance with their broader dimension.

**Table 3.1.1**

**List of Examined Explanatory Variables**

**Other Small Letter Volume Segment**

<b>Macroeconomic</b>	Australian Non-farm GDP
	Cheque Volumes
	Money Order Volumes
<b>Financial &amp; Substitutive</b>	Electronic Bill Payment Volumes
	Credit Card Volumes
	Direct Entry Payments for Debit Transfers
	Electronic Substitution (Internet Growth)
<b>Product</b>	Real Price of Other Small Letters
	Small Letter Delivery Performance
<b>Postal</b>	Introduction of Barcoding Technology
	Closure of the Unbarcoded PreSort Service
<b>Demographic</b>	Estimated Australian Population
<b>Extraneous Events</b>	September 11 Terrorist Attacks
	The Global Financial Crisis

**Table 3.1 2****List of Examined Explanatory Variables****PreSort Barcoded Small Letter Volume Segment**

	Australian Non-farm GDP
<b>Macroeconomic</b>	Advertising Industry Health Measure
	Australian Retail Trade
<b>Leading Indicators</b>	Consumer Sentiment
	Business Confidence
<b>Product</b>	Real Price of PreSort Barcoded Small Letters
	Small Letter Delivery Performance
<b>Substitutive</b>	Electronic Bill Presentment Volumes
	Electronic Substitution (Internet Growth)
<b>Postal</b>	Introduction of Barcoding Technology
	Closure of the Unbarcoded PreSort Service
<b>Financial</b>	Credit Card Volumes
<b>Legislation</b>	Introduction of the Goods and Services Tax
<b>Demographic</b>	Estimated Australian Population
	Federal Elections
<b>Political Events</b>	State Elections
	Referendums
<b>Extraneous Events</b>	September 11 Terrorist Attacks
	Sydney Olympic Games
	The Global Financial Crisis

### 3.2. SMALL LETTER HYPOTHESES

A summary of the explored research hypotheses for each potential explanatory variable is presented in this section.

Specifically, the relevant potential explanatory variables for Other Small Letter volumes, together with its corresponding rationale and hypothesised association direction are outlined in Table 3.2.1.

The equivalent list of hypotheses, rationale and association directions for PreSort Barcoded Small Letter volumes are outlined in Table 3.2.2.

**Table 3.2.1**

<b>Other Small Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Credit Card Volumes</b>	<b>Negative</b>
<i>Rationale:</i> Credit card volume movements are hypothesised to be negatively associated with Other Small Letter Volume movements. The growth in credit card volumes has enabled, in particular, bill payment substitutive behaviour (telephone and web-based) by past senders of Other Small Letters. Specifically credit card payments have to a large degree replaced traditional cheque and money order letter mail payments.	
<b>Cheque Volumes</b>	<b>Positive</b>
<i>Rationale:</i> Fluctuations in drawn cheque volumes are hypothesised to be positively associated with fluctuations in Other Small Letter volumes. Bill and other payments which are sent and received within Australia by sending cheques provide a positive stimulus to the demand for Other Small Letter volumes.	
<b>Money Order Volumes</b>	<b>Positive</b>
<i>Rationale:</i> Similar to cheque volumes, it is hypothesised that fluctuations in money order volumes are positively associated with fluctuations in Other Small Letter volumes. Bill and other payments which are sent and received within Australia by sending money orders provide a positive stimulus to the demand for Other Small Letter volumes.	
<b>Electronic Bill Payment Volumes</b>	<b>Negative</b>
<i>Rationale:</i> It is hypothesised that electronic bill payment volumes have negatively impacted demand for Other Small Letter volumes. The acceptance and growth of electronic bill payments has resulted in substitutive bill payment behaviour away from sending Other Small Letters containing cheques or money orders.	
<b>Direct Entry Payments for Debit Transfers</b>	<b>Negative</b>
<i>Rationale:</i> Fluctuations in direct debit payments are hypothesised to be negatively associated with fluctuations in Other Small Letter volumes. Direct entry payments have grown substantially in recent years which are assumed to be largely due to the increased use of this medium to automate bill payments.	
<b>Electronic Substitution (Internet Growth)</b>	<b>Negative</b>
<i>Rationale:</i> Growth in internet usage by households and businesses is hypothesised to be negatively associated with Other Small Letter volumes. This is due to businesses and households substituting sending ad-hoc Other Small Letters in favour of sending emails and/or downloading documents over the Internet.	
<b>Australian Non-farm GDP</b>	<b>Positive</b>
<i>Rationale:</i> Domestic Non-farm economic activity is hypothesised to be positively associated with Other Small Letter volumes. Ad hoc (non-bulk) mailings from larger corporations and small business are asserted to be stimulated in times of higher economic activity and dampened during times of slower economic activity.	

**Table 3.2.1 (Continued)**

**Other Small Letter Hypotheses**

Hypothesised Explanatory Variable	Hypothesised Direction of Association
<b>Small Letter Delivery Performance</b>	<b>Positive</b>
<p><i>Rationale:</i> Delivery performance is hypothesised to be positively associated with demand for Other Small Letter volumes. The rationale being that higher levels of delivery performance are likely to be associated with higher demand for Other Small Letter volumes. Conversely, lower levels of delivery performance are likely to be associated with lower demand for Other Small Letter volumes.</p>	
<b>Real Price of Other Small Letters</b>	<b>Negative</b>
<p><i>Rationale:</i> Rational economic demand theory suggests that demand for normal goods and services is negatively associated with price movements. Accordingly, demand for Other Small Letter volumes is hypothesised to be inversely associated with movements in the real price of Other Small Letters.</p>	
<b>Introduction of Barcoding Technology</b>	<b>Negative</b>
<p><i>Rationale:</i> The introduction of barcoding technology in letter mail processing in October 1999, together with its associated reduction in minimum lodgement quantities from 2,500 to 300 items, diverted demand from Other Small Letters to PreSort Barcoded Small Letters. This migration effect was largely the result of the considerable and sustained product advantages that PreSort Barcoded Small Letters offered over Other Small Letters regarding bulk mailings.</p>	
<b>Closure of the Unbarcoded PreSort Service</b>	<b>Positive</b>
<p><i>Rationale:</i> The closure of the Unbarcoded PreSort service, artificially stimulated Other small letter volumes. The closure of the Unbarcoded PreSort service resulted in demand shifting from the volume segment to its Other Small Letter counterpart.</p>	
<b>Estimated Australian Population</b>	<b>Positive</b>
<p><i>Rationale:</i> Underlying demand for Other Small Letter volumes is assumed to be determined by resident population levels and subsequent population movements. Upward movement in the resident population is hypothesised to stimulate demand for Other Small Letter volumes. Conversely, downward movement in the resident population is hypothesised to negatively impact demand for Other Small Letter volumes.</p>	
<b>Major Adverse Events</b>	<b>Negative</b>
<p><i>Rationale:</i> Major adverse events such as the September 11 terrorist attacks in the U.S. and the recent global financial crisis are hypothesised to negatively impact Other small letter volumes. The disruptive nature of major adverse events affects the stability of economic and social activity of Australia and its major trading partners. As a consequence, letter mail activity is assumed to be adversely affected.</p>	

**Table 3.2.2**

<b>PreSort Barcoded Small Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Australian Non-farm GDP</b>	<b>Positive</b>
<p><i>Rationale:</i> Domestic Non-farm economic activity is hypothesised to be positively associated with PreSort Barcoded Small Letter volumes. Bulk periodic letters (e.g. bills and statements) and bulk ad-hoc letters from major mailers are asserted to be stimulated in times of higher economic activity and dampened during times of slower economic activity. Growth in the domestic economy is hypothesised to be a key driver of PreSort Barcoded Small Letter volumes.</p>	
<b>Advertising Industry Health Measure</b>	<b>Positive</b>
<p><i>Rationale:</i> The health of the advertising industry is purported to be a key driver of the promotional letter component of PreSort Barcoded Small Letter volumes. Specifically, activity in the advertising industry (as reflected by fluctuations in the Australian Stock Exchange's Consumer Discretionary Index) is hypothesised to be positively associated with demand for PreSort Barcoded Small Letter volumes. Direct mail is assumed to constitute an important part of marketers' overall promotional tools, as such, as activity the health of the advertising industry improves so does the demand for PreSort Barcoded Small Letter volumes. Conversely, a stagnant or declining advertising industry is assumed to dampen demand for PreSort Barcoded Small Letter volumes.</p>	
<b>Credit Card Volumes</b>	<b>Positive</b>
<p><i>Rationale:</i> Credit card volume movements are hypothesised to be positively associated with PreSort Barcoded Small Letter Volume movements. The growth in credit card volumes has resulted in increased periodic bulk letter mailings of related credit card statements to card holders.</p>	
<b>Electronic Bill Presentment Volumes</b>	<b>Negative</b>
<p><i>Rationale:</i> As a large proportion of transactional PreSort Barcoded Small Letter volumes consists of bill presentment letter mail, growth in the acceptance and volumes of electronic bill presentments, represents direct threat to demand for such letter mail. Accordingly, growth in electronic bill presentment volumes is hypothesised to be negatively associated with PreSort Barcoded Small Letter volumes.</p>	
<b>Electronic Substitution (Internet Growth)</b>	<b>Negative</b>
<p>Growth in internet usage by households and businesses is hypothesised to be negatively associated with PreSort Barcoded Small Letter volumes. This is due to business senders of bulk bills and statements incentivising recipients to receive such bills and statements as electronic documents rather than via a traditional mail item.</p>	
<b>Australian Retail Trade</b>	<b>Positive</b>
<p><i>Rationale:</i> Direct mail is a specific means by which retailers drive consumer and business activity. Accordingly, retail trade activity is hypothesised to be positively associated with PreSort Barcoded Small Letter volumes.</p>	
<b>Small Letter Delivery Performance</b>	<b>Positive</b>
<p><i>Rationale:</i> As per Other Small Letter volumes, small letter delivery performance is hypothesised to be positively associated with demand for PreSort Barcoded Small Letter volumes. The rationale is consistent with the Other Small Letter product stream i.e. movements in delivery performance are positively associated with movements in PreSort Barcoded Small Letter volumes.</p>	
<b>Real Price of PreSort Barcoded Small Letters</b>	<b>Negative</b>
<p><i>Rationale:</i> Rational economic demand theory suggests that demand for normal goods and services is negatively associated with price movements. Accordingly, demand for PreSort Barcoded Small Letter volumes is hypothesised to be inversely associated with movements in the real price of PreSort Barcoded Small Letters.</p>	

**Table 3.2.2 (Continued)**

<b>PreSort Barcoded Small Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Estimated Australian Population</b>	<b>Positive</b>
<i>Rationale:</i> Growth in the estimated resident population is assumed to be positively associated with volume movements in PreSort Barcoded Small Letters. Theoretically, marginal population changes (for instance due to positive net migration) will result in increased household formation which stimulates demand for bills and statements. Moreover, there is assumed to be a stimulatory effect on bulk promotional letter mailings in line with population growth.	
<b>Introduction of Barcoding Technology</b>	<b>Positive</b>
<i>Rationale:</i> The introduction of barcoding technology in letter mail processing in October 1999, together with its associated reduction in minimum lodgement quantities from 2,500 to 300 items, diverted demand from Other Small Letters to PreSort Barcoded Small Letters. This migration effect was largely the result of the considerable and sustained product advantages that PreSort Barcoded Small Letters offered over Other Small Letters regarding bulk mailings.	
<b>Closure of the Unbarcoded PreSort Service</b>	<b>Negative</b>
<i>Rationale:</i> The closure of the Unbarcoded PreSort service, directly reduced demand for PreSort Small Letters and simultaneously stimulated demand for Other small letter volumes.	
<b>Consumer Sentiment</b>	<b>Positive</b>
<i>Rationale:</i> The level of consumer confidence is widely accepted as a leading indicator of consumer spend, particularly discretionary spending. It is therefore hypothesised to be positively associated with PreSort Barcoded Small Letter volumes. More aptly, as it is a leading indicator of spend, a lagged value of the index is hypothesised to be positively associated with PreSort Barcoded Small Letter volumes. Retailers and manufacturers are assumed to respond to changes in consumer sentiment by increasing direct mail campaigns during times of higher sentiment and reducing direct mail campaigns during times of lower sentiment.	
<b>Business Confidence</b>	<b>Positive</b>
<i>Rationale:</i> Similar to consumer confidence, business confidence is a leading indicator of future business expenditure and investment. A lagged value of business confidence is hypothesised to be positively associated with PreSort Barcoded Small Letter volumes. Businesses are assumed to expand promotional activities such as direct mail campaigns when business confidence is higher and contract promotional activities when business confidence is subdued.	
<b>Political Events</b>	<b>Positive</b>
<i>Rationale:</i> Federal elections, State elections and Referendums are hypothesised to stimulate demand for PreSort Barcoded Small Letter volumes. The election campaign, which typically lasts for six weeks, is characterised by the use of bulk promotional letter mail by political parties to garner voter support. Table 3.2.3. below details each political event that was statistically assessed in this research project.	
<b>Major Events (Adverse &amp; Sporting)</b>	<b>Negative</b>
<i>Rationale:</i> Major adverse events (international and domestic) as well as major domestic sporting events such as the Sydney Olympic Games of 2000, temporarily impact usual and regular business decisions. For instance, the September 11 terrorist attacks in the U.S. temporarily destabilised the U.S economy and financial markets, which had ramifications for Australia and the U.S.'s other trading partners. This in turn negatively impacted PreSort Barcoded Small Letter volumes, which are highly correlated with economic growth. In addition, the staging of the Sydney Olympic Games in 2000 resulted in advertising expenditure being diverted from usual marketing activities, such as direct mail campaigns, to corporate sponsorship related to the Sydney Olympic Games. As such, major events are hypothesised to be negatively associated with PreSort Barcoded Small Letter volumes. Testing in this category also includes the recent global financial crisis.	
<b>Introduction of the Goods and Services Tax (GST)</b>	<b>Positive</b>
<i>Rationale:</i> The introduction of the Goods and Services Tax in 2000, is hypothesised to have stimulated both promotional and transactional PreSort Barcoded Small Letter volumes. In an attempt to ready both small and large businesses for this major taxation change, bulk direct mail was used to create awareness of the impact of the GST and bulk business mail was used to address administrative and compliance issues.	



Each Federal and State election and Referendum held in Australia since July 1995 is presented in Table 3.2.3.

Each of these elections and referendums were statistically assessed in this research project where political events were deemed to be a potential driver of letter mail volumes.

**Table 3.2.3**

Date	Jurisdiction	Election Type	Date	Jurisdiction	Election Type
2-Mar-96	National	Federal	20-Oct-01	A.C.T	State
3-Oct-98	National	Federal	10-Nov-01	National	State
9-Oct-04	National	Federal	9-Feb-02	South Australia	State
24-Nov-07	National	Federal	20-Jul-02	Tasmania	State
6-Nov-99	National	Referendum	30-Nov-02	Victoria	State
15-Jul-95	Queensland	State	22-Mar-03	New South Wales	State
24-Feb-96	Tasmania	State	7-Feb-04	Queensland	State
30-Mar-96	Victoria	State	16-Oct-04	A.C.T	State
14-Dec-96	Western Australia	State	26-Feb-05	Western Australia	State
30-Aug-97	Northern Territory	State	18-Jun-05	Northern Territory	State
11-Oct-97	South Australia	State	18-Mar-06	South Australia	State
21-Feb-98	A.C.T	State	18-Mar-06	Tasmania	State
13-Jun-98	Queensland	State	9-Sep-06	Queensland	State
29-Aug-98	Tasmania	State	25-Nov-06	Victoria	State
27-Mar-99	New South Wales	State	24-Mar-07	New South Wales	State
18-Sep-99	Victoria	State	9-Aug-08	Northern Territory	State
10-Feb-01	Western Australia	State	6-Sep-08	Western Australia	State
17-Feb-01	Queensland	State	18-Oct-08	A.C.T	State
18-Aug-01	Northern Territory	State	21-Mar-09	Queensland	State

It should however be noted that only rudimentary examinations of elections and referendums can be undertaken within an econometric process due to the difficulty in isolating the associated lags on election related mail within a matrix consisting solely of dichotomous variables.

Additionally, should the mailing behaviour of the political parties as pertains to election related mail alter over the sampled timeframe such subtle dynamics will not be evident in effectively embedding likely future patterns into the *ex-ante* forecasts.

It is therefore recommended that any further insight into election related mailings be utilised to augment the baseline econometric *ex-ante* forecasts.

The potential explanatory variables of Other Large Letter volumes are presented in Table 3.3.1, categorised into the following six thematic groups: (i) Macroeconomic; (ii) Product; (iii) Internet Competition; (iv) Postal; (v) Extraneous Events; and (vi) Demographic.

As with the small letter segment, in-depth discussions held between Diversified Specifics and Australia Post management informed the hypotheses development. Trends in international postal markets as well as rational economic theory were also key determinants in the formation of the large letter research hypotheses.

Economic activity at industry level was again assessed to derive the extent to which industry idiosyncrasies were associated with both Other Large Letter volumes and PreSort Barcoded Large Letter volumes. The inclusion of specific industries was based on historical studies involving Australia Post charge account industry volume shares as well as utilising a logical rationale to determine possible linkages amongst letter volume segments and the industry-based drivers that are to be investigated.

**Table 3.3.1**

**List of Examined Explanatory Variables  
Other Large Letter Volume Segment**

<b>Macroeconomic</b>	Australian Non-farm GDP
	Information Media and Telecommunications Industry Economic Activity
	Finance and Insurance Services Industry Economic Activity
	Public Administration and Safety Industry Economic Activity
	Retail Trade Industry Economic Activity
	Wholesale Trade Industry Economic Activity
	Health Care and Social Assistance Industry Economic Activity
	Education and Training Industry Economic Activity
<b>Product</b>	Large Letter Delivery Performance
	Real Price of Other Large Letters
<b>Electronic Substitution</b>	Internet Growth
<b>Postal</b>	Introduction of Barcoding Technology
	Closure of the Unbarcoded PreSort Service
<b>Extraneous Events</b>	September 11 Terrorist Attacks
	The Global Financial Crisis
<b>Demographic</b>	Estimated Australian Population

A similar set of thematic groupings categorises the potential explanatory variables of PreSort Barcoded Large Letter volumes, as outlined in Table 3.3.2.

**Table 3.3 2**

**List of Examined Explanatory Variables**

<b>PreSort Barcoded Large Letter Volume Segment</b>	
	Australian Non-farm GDP
	Advertising Industry Health Measure
	Information Media and Telecommunications Industry Economic Activity
<b>Macroeconomic</b>	Finance and Insurance Services Industry Economic Activity
	Public Administration and Safety Industry Economic Activity
	Retail Trade Industry Economic Activity
	Manufacturing Industry Economic Activity
<b>Leading Indicators</b>	Consumer Sentiment
	Business Confidence
<b>Product</b>	Large Letter Delivery Performance
	Real Price of PreSort Barcoded Large Letters
<b>Postal</b>	Introduction of Barcoding Technology
	Closure of the Unbarcoded PreSort Service
<b>Input Costs</b>	Paper as an Input Cost
	Paper as an Input Cost for Direct Mail
<b>Share Market</b>	Major Australian Initial Public Offerings (IPO's)
<b>Demographic</b>	Estimated Australian Population
<b>Extraneous Events</b>	September 11 Terrorist Attacks
	Sydney Olympic Games
	The Global Financial Crisis

### 3.4. LARGE LETTER HYPOTHESES

A summary of the explored research hypotheses for each potential explanatory variable is presented in this section.

Specifically, the relevant potential explanatory variables for Other Large Letter volumes, together with its corresponding rationale and hypothesised association direction are outlined in Table 3.4.1.

The equivalent list of hypotheses, rationale and association directions for PreSort Barcoded Large Letter volumes are outlined in Table 3.4.2.

**Table 3.4.1**

<b>Other Large Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Australian Non-farm GDP</b>	<b>Positive</b>
<i>Rationale:</i> Other Large Letter volumes are hypothesised to be positively associated with Australian Non-farm GDP. Fluctuations in economic activity therefore, are asserted to positively influence Other Large Letter volumes. Specifically, positive growth in economic activity is hypothesised to drive positive growth in Other Large Letter volumes. Conversely, negative growth in economic activity is hypothesised to drive negative growth in Other Large Letter volumes. Similarly, growth in each of the industries presented below are hypothesised to be positively associated with Other Large Letter volumes.	
<b>Information Media &amp; Telecommunications Industry Economic Activity</b>	<b>Positive</b>
<b>Finance and Insurance Services Industry Economic Activity</b>	<b>Positive</b>
<b>Public Administration and Safety Industry Economic Activity</b>	<b>Positive</b>
<b>Retail Trade Industry Economic Activity</b>	<b>Positive</b>
<b>Wholesale Trade Industry Economic Activity</b>	<b>Positive</b>
<b>Health Care and Social Assistance Industry Economic Activity</b>	<b>Positive</b>
<b>Education and Training Industry Economic Activity</b>	<b>Positive</b>
<i>Rationale:</i> Based on the same reasoning as Non-farm economic activity, economic growth in each of the industries presented above is hypothesised to be positively associated with Other Large Letter volumes.	
<b>Large Letter Delivery Performance</b>	<b>Positive</b>
<i>Rationale:</i> Delivery performance is hypothesised to be positively associated with demand for Other Large Letter volumes. It is suggested that higher levels of delivery performance are associated with higher demand for Other Large Letter volumes. Conversely, lower levels of delivery performance are associated with lower demand for Other Large Letter volumes.	
<b>Real Price of Other Large Letters</b>	<b>Negative</b>
<i>Rationale:</i> Rational economic demand theory suggests that demand for normal goods and services is negatively associated with price movements. Accordingly, demand for Other Large Letter volumes is hypothesised to be inversely associated with movements in the real price of Other Large Letters.	
<b>Introduction of Barcoding Technology / Reduction to 300</b>	<b>Negative</b>
<i>Rationale:</i> The introduction of barcoding technology in letter mail processing in October 1999, together with its associated reduction in minimum lodgement quantities from 2,500 to 300 items, diverted demand from Other Large Letters to PreSort Barcoded Large Letters. This migration effect is assumed to be the result of the considerable and sustained product advantages that PreSort Barcoded Large Letters offered over Other Large Letters regarding bulk mailings.	
<b>Closure of the Unbarcoded PreSort Service</b>	<b>Positive</b>
<i>Rationale:</i> A positive impact on Other Large Letter volumes resulted from the closure of the Unbarcoded PreSort service. Rather than demand filtering through to the Barcoded PreSort service, a different demand migration resulted in which demand reduced for PreSort Barcoded Large Letters in favour of Other Large Letters.	

**Table 3.4.1 (Continued)**

<b>Other Large Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Electronic Substitution (Internet Growth)</b>	<b>Negative</b>
<i>Rationale:</i> It is hypothesised that growth in the Internet as a whole has led to a reduction in demand for Other Large Letter volumes. The growth in the acceptance and usage of the Internet has enabled document transmission via emails and downloadable reports/documents. Prior to the Internet, such documents (that were non-bulk letter mail) were sent as Other Large Letters.	
<b>Estimated Australian Population</b>	<b>Positive</b>
<i>Rationale:</i> As per their small letter counterpart, demand for Other Large Letter volumes is assumed to be positively associated with resident population movements.	
<b>Major Adverse Events</b>	<b>Negative</b>
<i>Rationale:</i> Major adverse events such as the September 11 terrorist attacks in the U.S. and the recent global financial crisis are hypothesised to negatively impact Other Large letter volumes. The disruptive nature of major adverse events affects the stability of economic and social activity of Australia and its major trading partners. As a consequence, letter mail activity is assumed to be adversely affected.	

Table 3.4.2

<b>PreSort Barcoded Large Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Australian Non-farm GDP</b>	<b>Positive</b>
<i>Rationale:</i> As per their small letter counterpart, PreSort Barcoded Large Letter volumes are highly driven by domestic economic growth i.e. Non-farm GDP. Fluctuations in domestic non-farm economic activity are positively associated with PreSort Barcoded Large Letter volumes.	
<b>Advertising Industry Health Measure</b>	<b>Positive</b>
<i>Rationale:</i> The promotional component of PreSort Barcoded Large Letter volumes is assumed to be largely affected by the state of Australia's advertising industry. In effect, a well-performing advertising industry is more likely to result in stimulated demand for PreSort Barcoded Large Letter volumes than is a subdued advertising industry.	
<b>Information Media &amp; Telecommunications Industry Economic Activity</b>	<b>Positive</b>
<b>Finance and Insurance Services Industry Economic Activity</b>	<b>Positive</b>
<b>Public Administration and Safety Industry Economic Activity</b>	<b>Positive</b>
<b>Retail Trade Industry Economic Activity</b>	<b>Positive</b>
<b>Manufacturing Industry Economic Activity</b>	<b>Positive</b>
<i>Rationale:</i> Economic activity within selected industries (excluding the advertising industry which is assessed separately and outlined above) is hypothesised to be positively associated with demand for PreSort Barcoded Large Letter volumes.	
<b>Large Letter Delivery Performance</b>	<b>Positive</b>
<i>Rationale:</i> Large letter delivery performance is hypothesised to be positively associated with demand for PreSort Barcoded Large Letter. Senders' perceived unacceptable levels of delivery performance would be expected to result in increased demand for alternatives to PreSort Barcoded Large Letter volumes.	
<b>Real Price of PreSort Barcoded Large Letters</b>	<b>Negative</b>
<i>Rationale:</i> Rational economic demand theory suggests that demand for normal goods and services is negatively associated with real price movements. Accordingly, demand for PreSort Barcoded Large Letter volumes is hypothesised to be inversely associated with movements in the real price of PreSort Barcoded Large Letters.	
<b>Introduction of Barcoding Technology / Reduction to 300</b>	<b>Positive</b>
<i>Rationale:</i> The introduction of barcoding technology in letter mail processing in October 1999, together with its associated reduction in minimum lodgement quantities from 2,500 to 300 items, diverted demand from Other Large Letters to PreSort Barcoded Large Letters. This migration effect is assumed to be the result of the considerable and sustained product advantages that PreSort Barcoded Large Letters offered over Other Large Letters regarding bulk mailings.	
<b>Closure of the Unbarcoded PreSort Service</b>	<b>Positive</b>
<i>Rationale:</i> A positive impact on Other Large Letter volumes resulted from the closure of the Unbarcoded PreSort service. Rather than demand filtering through to the Barcoded PreSort service, a different demand migration resulted in which demand reduced for PreSort Large Letters in favour of Other Large Letters.	
<b>Paper as an Input Cost (1) Paper Stationery</b>	<b>Negative</b>
<b>Paper as an Input Cost (2): Printing &amp; Services to Print</b>	<b>Negative</b>
<i>Rationale:</i> Increasing Paper costs, particularly for promotional letters, are hypothesised to be inversely associated with demand for PreSort Barcoded Large Letter volumes. Input costs such as paper costs to impact upon the overall cost of producing a direct mail large letter item.	
<b>Estimated Australian Population</b>	<b>Negative</b>
<i>Rationale:</i> Growth in the estimated resident population is assumed to be positively associated with volume movements in PreSort Barcoded Large Letter volumes. Positive population growth is asserted to stimulate underlying demand for both promotional and transactional PreSort Barcoded Large Letter volumes.	

**Table 3.4.2 (Continued)**

<b>PreSort Barcoded Large Letter Hypotheses</b>	
<b>Hypothesised Explanatory Variable</b>	<b>Hypothesised Direction of Association</b>
<b>Major Events (Adverse &amp; Sporting)</b>	<b>Negative</b>
<p><i>Rationale:</i> Major adverse events (international and domestic) as well as major domestic sporting events such as the Sydney Olympic Games of 2000, temporarily impact regular business decisions. For instance, the September 11 terrorist attacks in the U.S. temporarily destabilised the U.S economy and financial markets, which had ramifications for Australia and the U.S.'s other trading partners. This in turn negatively impacted PreSort Barcoded Large Letter volumes, which are highly correlated with economic growth. In addition, the staging of the Sydney Olympic Games in 2000 resulted in advertising expenditure being diverted from usual marketing activities, such as direct mail campaigns, to corporate sponsorship related to the Sydney Olympic Games. Testing in this category also includes the recent global financial crisis.</p>	

## 3.5. DATA TRENDS AND ISSUES

---

### 3.5.1 COMPILING THE DATA

Letters Group at Australia Post supplied Diversified Specifics with segmented letter volume data in addition to data on some of the potential drivers over the July 1995 to June 2009 timeframe.

All trends, associations, elasticities and forecasts are therefore a direct function of the letter volume data as provided by Australia Post's internal data collection systems, which are beyond the control of Diversified Specifics.

Similar to recent studies in this series of research reports, Diversified Specifics sourced a series of external variables underlining each hypothesis prior to the vector error correction model development process.

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

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

On occasions, limitations in assessing certain hypotheses were given by inadequate data lengths 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 reside in Appendix A (Table A.1) of this research document.



## 3.5.2 DATA TRENDS

### 3.5.2.1 Numerical Descriptive Trend Summary

Presented in Table 3.5.2.1 are the annual percentage growth rates since 1995/96 for each of the metric potential explanatory variables for Other Small Letter volumes.

**Table 3.5.2.1**

Annual Percentage Growth Rates Related to the Other Small Letter Volume Study														
Variables Utilised in the Other Small 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	08/09
<b>Other Small Letter Volumes</b>	-	1.62%	-1.08%	1.30%	-3.20%	3.89%	-2.03%	5.19%	-2.93%	-3.41%	-2.93%	-3.45%	-2.08%	-7.12%
Credit Card Volumes	6.17%	7.32%	5.78%	5.69%	7.86%	3.44%	7.39%	2.25%	7.14%	6.54%	8.09%	4.39%	3.60%	2.32%
Cheque Volumes	-	-	-	-	-	-	-	-	-4.49%	-8.93%	-7.81%	-6.45%	-9.69%	-10.92%
Money Order Volumes	-	6.76%	9.65%	7.42%	-0.66%	-3.21%	-1.62%	-5.09%	-2.09%	-2.75%	-3.91%	-9.53%	-11.39%	-14.32%
Australian Non-farm GDP	3.77%	3.78%	4.55%	5.04%	3.88%	1.93%	3.86%	3.89%	3.66%	2.81%	3.08%	4.30%	3.66%	0.79%
Small Letter Delivery Performance	-	-0.52%	-1.16%	1.06%	2.53%	0.10%	-1.33%	-1.98%	1.70%	0.94%	-0.72%	-0.42%	-0.52%	-1.16%
Real Price of Other Small Letters	-	-0.33%	-0.66%	-1.06%	-3.09%	-15.11%	-2.76%	8.20%	-2.42%	-2.43%	-3.82%	-2.03%	-4.31%	8.42%
Estimated Australian Population	-	1.13%	1.05%	1.15%	1.20%	1.36%	1.23%	1.24%	1.17%	1.33%	1.49%	1.81%	1.71%	2.07%

\*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) Major Adverse Events. Furthermore, data for some of the hypothesised drivers were absent, discontinued or did not conform to the desired time series frequency employed in this analysis and excluded from the above table.

A complete set of charts benchmarking each of the above explanatory variables against Other Small Letter volume fluctuations is provided in the Descriptive Charting document that is supplementary to this report.

Presented in Table 3.5.2.2 are the annual percentage growth rates since 1995/96 for each of the metric potential explanatory variables for PreSort Barcoded Small Letter volumes.

**Table 3.5.2.2**

Annual Percentage Growth Rates Related to the PreSort Barcoded Small Letter Volume Study														
Variables Utilised in the PreSort Barcoded Small 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	08/09
<b>PreSort Barcoded Small Letter Volumes</b>	-	7.97%	11.25%	6.85%	17.75%	3.74%	3.68%	-6.45%	5.23%	3.82%	3.02%	4.21%	6.15%	-1.07%
Australian Non-farm GDP	3.77%	3.78%	4.55%	5.04%	3.88%	1.93%	3.86%	3.89%	3.66%	2.81%	3.08%	4.30%	3.66%	0.79%
Advertising Industry Health Measure	-	-7.33%	54.32%	25.89%	45.31%	-18.02%	-24.69%	-11.74%	24.62%	1.34%	7.63%	25.26%	-34.92%	-35.18%
Credit Card Volumes	6.17%	7.32%	5.78%	5.69%	7.86%	3.44%	7.39%	2.25%	7.14%	6.54%	8.09%	4.39%	3.60%	2.32%
Australian Retail Trade	4.60%	4.95%	3.57%	5.11%	3.82%	1.84%	6.64%	4.61%	5.30%	5.78%	1.37%	5.32%	5.70%	1.63%
Small Letter Delivery Performance	-	-0.52%	-1.16%	1.06%	2.53%	0.10%	-1.33%	-1.98%	1.70%	0.94%	-0.72%	-0.42%	-0.52%	-1.16%
Real Price of PreSort Barcoded Small Letters	-	-0.33%	-0.66%	-1.06%	-3.09%	-15.11%	-2.76%	-2.62%	-2.42%	-2.43%	-3.82%	-2.03%	-4.31%	18.28%
Estimated Australian Population	-	1.13%	1.05%	1.15%	1.20%	1.36%	1.23%	1.24%	1.17%	1.33%	1.49%	1.81%	1.71%	2.07%
Consumer Sentiment	-0.69%	-2.23%	-1.43%	5.21%	-1.60%	-5.33%	8.37%	-2.11%	8.11%	1.08%	-8.64%	2.22%	-5.03%	-13.91%
Business Confidence	-	5.50%	-5.15%	-0.76%	-1.81%	-2.09%	12.66%	-5.62%	3.71%	-3.85%	0.35%	0.04%	-6.09%	-16.82%

\* 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(Adverse & Sporting); & Introduction of the Goods and Services Tax (GST). Furthermore, data for some of the hypothesised drivers were absent, discontinued or did not conform to the desired time series frequency employed in this analysis and excluded from the above table.

A complete set of charts benchmarking each of the above explanatory variables against PreSort Barcoded Small Letter volume fluctuations is provided in the Descriptive Charting document that is supplementary to this report.

Presented in Table 3.5.2.3 are the annual percentage growth rates since 1995/96 for each of the metric potential explanatory variables for Other Large Letter volumes.

**Table 3.5.2.3**

<b>Annual Percentage Growth Rates Related to the Other Large Letter Volume Study</b>														
<b>Variables Utilised in the Other Large Letter Volume Study*</b>	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	08/09
<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>0.56%</b>	<b>1.88%</b>	<b>-0.05%</b>	<b>2.76%</b>	<b>-1.74%</b>	<b>-3.68%</b>
Australian Non-farm GDP	3.77%	3.78%	4.55%	5.04%	3.88%	1.93%	3.86%	3.89%	3.66%	2.81%	3.08%	4.30%	3.66%	0.79%
Information Media and Telecommunications Industry	8.48%	7.29%	8.12%	7.22%	2.95%	3.60%	2.81%	6.23%	4.50%	2.44%	4.13%	6.24%	6.20%	<b>-2.07%</b>
Finance and Insurance Services Industry	4.23%	1.83%	4.04%	9.71%	6.48%	1.63%	3.80%	2.29%	6.85%	3.85%	6.03%	9.58%	4.55%	<b>-1.51%</b>
Public Administration and Safety Industry	1.26%	4.04%	<b>-0.67%</b>	5.31%	2.05%	2.25%	4.11%	<b>-0.82%</b>	1.63%	3.34%	2.29%	4.67%	0.46%	5.78%
Rental, Hiring & Real Estate Services Industry	4.34%	4.16%	4.28%	2.36%	4.22%	<b>-1.79%</b>	2.44%	9.65%	1.11%	0.30%	4.65%	<b>-3.14%</b>	1.48%	3.93%
Retail Trade Industry	4.60%	4.95%	3.57%	5.11%	3.82%	1.84%	6.64%	4.61%	5.30%	5.78%	1.37%	5.32%	5.70%	1.63%
Wholesale Trade Industry	6.65%	5.30%	6.59%	3.26%	5.05%	<b>-0.62%</b>	2.59%	4.71%	4.69%	3.76%	3.30%	2.12%	2.97%	1.35%
Health Care and Social Assistance Industry	5.58%	2.48%	3.42%	2.69%	4.93%	4.62%	5.35%	4.33%	4.24%	3.94%	5.01%	4.09%	4.99%	3.00%
Education Industry	2.18%	3.72%	2.27%	3.53%	1.07%	1.81%	1.86%	1.77%	1.35%	1.42%	1.50%	1.78%	2.12%	1.99%
Large Letter Delivery Performance	-	-	-	<b>-3.34%</b>	-1.90%	5.69%	1.51%	1.38%	<b>-3.14%</b>	<b>-2.70%</b>	2.22%	3.15%	1.68%	<b>-2.90%</b>
Real Price of Other Large Letters	-	<b>-0.33%</b>	<b>-0.66%</b>	<b>-1.06%</b>	8.35%	2.70%	<b>-2.76%</b>	<b>-2.62%</b>	<b>-2.42%</b>	<b>-2.43%</b>	<b>-3.82%</b>	<b>-2.03%</b>	<b>-4.31%</b>	10.63%
Estimated Australian Population	-	1.13%	1.05%	1.15%	1.20%	1.36%	1.23%	1.24%	1.17%	1.33%	1.49%	1.81%	1.71%	2.07%

*\*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 2009). Furthermore, data for some of the hypothesised drivers were absent, discontinued or did not conform to the desired time series frequency employed in this analysis and excluded from the above table.*

A complete set of charts benchmarking each of the above explanatory variables against Other Large Letter volume fluctuations is provided in the Descriptive Charting document that is supplementary to this report.

Presented in Table 3.5.2.4 are the annual percentage growth rates since 1995/96 for each of the metric potential explanatory variables for PreSort Barcoded Large Letter volumes.

**Table 3.3.2.4**

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	08/09
<b>PreSort Barcoded Large Letter Volumes</b>	-	20.18%	18.49%	0.15%	39.54%	5.41%	2.17%	-18.47%	21.64%	4.89%	4.92%	5.24%	-0.44%	-10.49%
Australian Non-farm GDP	3.77%	3.78%	4.55%	5.04%	3.88%	1.93%	3.86%	3.89%	3.66%	2.81%	3.08%	4.30%	3.66%	0.79%
Advertising Industry Health Measure	-	-7.33%	54.32%	25.89%	45.31%	-18.02%	-24.69%	-11.74%	24.62%	1.34%	7.63%	25.26%	-34.92%	-35.18%
Information Media and Telecommunications Industry	8.48%	7.29%	8.12%	7.22%	2.95%	3.60%	2.81%	6.23%	4.50%	2.44%	4.13%	6.24%	6.20%	-2.07%
Finance and Insurance Services Industry	4.23%	1.83%	4.04%	9.71%	6.48%	1.63%	3.80%	2.29%	6.85%	3.85%	6.03%	9.58%	4.55%	-1.51%
Public Administration and Safety Industry	1.26%	4.04%	-0.67%	5.31%	2.05%	2.25%	4.11%	-0.82%	1.63%	3.34%	2.29%	4.67%	0.46%	5.78%
Retail Trade Industry	4.60%	4.95%	3.57%	5.11%	3.82%	1.84%	6.64%	4.61%	5.30%	5.78%	1.37%	5.32%	5.70%	1.63%
Manufacturing Industry	2.28%	1.59%	2.76%	1.94%	0.84%	2.11%	2.16%	4.19%	1.14%	-1.14%	-0.26%	1.87%	4.05%	-5.92%
Large Letter Delivery Performance	-	-	-	-3.34%	-1.90%	5.69%	1.51%	1.38%	-3.14%	-2.70%	2.22%	3.15%	1.68%	-2.90%
Real Price of PreSort Barcoded Large Letters	-	-5.38%	-2.38%	2.63%	2.37%	-4.81%	0.97%	-0.28%	-4.78%	-3.76%	-6.66%	-4.31%	-5.26%	3.46%
Paper as an Input Cost	-	-1.60%	-0.63%	0.36%	0.81%	3.68%	1.21%	0.51%	-0.09%	0.17%	1.19%	2.43%	-0.49%	2.80%
Paper as an Input Cost for Direct Mail	-	-1.16%	-2.43%	3.04%	-0.09%	10.13%	0.24%	0.32%	-2.83%	1.42%	-1.64%	1.59%	0.49%	3.19%
Estimated Australian Population	-	1.13%	1.05%	1.15%	1.20%	1.36%	1.23%	1.24%	1.17%	1.33%	1.49%	1.81%	1.71%	2.07%

\* 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. Furthermore, data for some of the hypothesised drivers were absent, discontinued or did not conform to the desired time series frequency employed in this analysis and excluded from the above table.

A complete set of charts benchmarking each of the above explanatory variables against PreSort Barcoded Large Letter volume fluctuations is provided in the Descriptive Charting document that is supplementary to this report.

### 3.5.3 DATA ISSUES

Various data issues may in some cases limit the ability to source or indeed construct data that adequately measures quantitatively the movements in a number of prospective letter volume demand drivers.

In the extreme case, data issues may prohibit potential explanatory variables from being econometrically tested within the existing framework.

In the moderate case, limitations that impact the analysis must be acknowledged, contextualised and highlighted for increasing attention in future updates and in any augmentation of the econometric forecasts.

Data issues related to such variables are subsequently outlined in this section.

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

In the absence of a direct measurement reflecting the health of the advertising industry, a broad measure has been utilised i.e. the S&P/ASX 200 Consumer Discretionary Index.

As with any broad measure, the scope and coverage of this measure is indicative of the health of the advertising industry rather than reflective of a direct measure.

In particular, the S&P/ASX 200 Consumer Discretionary Index reflects a range of industries and includes the media industry. As stated on the Australian Stock Exchange's website:

*"The S&P/ASX 200 Consumer Discretionary Index (XDJ) encompasses those industries that tend to be the most sensitive to economic cycles. Its manufacturing segment includes automotive, household durable goods, textiles and apparel and leisure equipment. The services segment includes hotels, restaurants and other leisure facilities, media production and services, and consumer retailing and services."<sup>13</sup>*

The Index therefore, reflects (among other things) general economic conditions in the media industry. That said, its correlation with the former ASX Media Index was near one where daily data for both indexes was available.

The limitations of the S&P/ASX 200 Consumer Discretionary Index however, must be acknowledged and interpreted accordingly.

---

<sup>13</sup> Australian Securities Exchange, Web Link:  
[http://www.asx.com.au/products/indices/types/sector.htm#consumer\\_discretionary\\_index](http://www.asx.com.au/products/indices/types/sector.htm#consumer_discretionary_index)

## Electronic Substitution (Internet Growth)

Obtaining a suitable data series that robustly measures the number of Australian internet connections, has proved to be a difficult task.

Whilst there are data series available, they each possess limitations that ultimately rendered them inappropriate for inclusion in an econometric framework that is premised upon quarterly observations.

For instance, the Australian Bureau of Statistics publication '8153.0 - Internet Activity, Australia', is not a quarterly data series and has also not been periodically consistent. The series commenced in September 2000 as a quarterly publication for the first year of publication, then became an irregular six-monthly publication. Whilst this series provided quantification of the number of active internet subscribers in Australia, it did not do so on a regular quarterly basis. It was decided not to interpolate between observation points as this would detract from the statistical credibility of the ensuing coefficients.

As another example, the ACCC's Snapshot of broadband deployment publication commenced as a quarterly publication in March 2002. This publication depicted the "total number of end-user [broadband] connections" but unfortunately was discontinued in September 2006.

## Electronic Bill Payment and Presentment Volumes

Whilst data snapshots and commentary are readily available that outline the growth of electronic bill payments and presentments, tractable time series data is lacking. This limits the ability to econometrically model such data to directly ascertain (a) the impact of electronic bill payment growth on Other Small Letter volumes; and (b) the impact of electronic bill presentment growth on Other and PreSort Barcoded Small Letter volumes.

Alternative tractable time series data has instead been employed to capture movements away from the traditional mail item on the bill payments side of a transaction such as: 1) Credit card volumes as an enabler of substitutive alternatives (phone and internet mediums); and 2) Direct entry payments for debit transfers.

No alternatives were available to reflect electronic bill presentment volumes and likely future behavioural changes in this area over the forecast period will need to augment the *ex-ante* econometric forecasts should additional non-empirical market intelligence exist.

It might be feasible to utilise growth rates in an electronic bill presentment offering, such as BPay View to discount *ex-ante* PreSort Barcoded Small Letter forecasted volume growth. However, a more meaningful extrapolation of these trends would require information on the penetration level of BPay View into the overall electronic bill presentments market. Then the BPay View effects could be multiplied across to give a more meaningful reflection of likely substitutive letter volume losses in this area. The availability of such penetration levels has not been investigated in this research undertaking.

## Cheque Volumes and Direct Entry Payments (Debit Transfers)

Collection of data on cheque volumes and direct entry payments for debit transfers data commenced on a monthly basis from January 2002 by the Reserve Bank of Australia (RBA). Trends relating to the pre-2002 period are unknown (on a monthly or quarterly basis) for these variables. This limits any model development which includes either of these variables as a potential letter volume explainer to periods from January 2002 onwards as a significant number of observations is required for increased statistical integrity emanating out of the econometric process.

It is however important to note that these variables provide a direct indication of declines in usage levels of the traditional mail item and therefore will be monitored in future updates.

## Good and Services Tax

A problem that was encountered with assessing the impact of the Goods and Services Tax (GST) on PreSort Barcoded Small Letter volumes, resulted from the timing of the impact of the introduction of the GST coinciding with the lead-up and staging of the 2000 Sydney Olympic Games. The simultaneous effects therefore were impossible to isolate and measure econometrically utilising a dichotomous variable approach within the econometric framework.

## Paper as an Input Cost

Despite significant attempts to obtain a direct measurement of paper as an input cost for promotional PreSort Barcoded Large Letters, there was no measure that was publicly available. As such, broad measures were obtained as a next best alternative.

The absence of a direct measure limits the ability to confidently draw a conclusion on the estimated cost elasticity of paper related to promotional PreSort Barcoded Large Letters.

Analysis in this document that includes this variable, should therefore be interpreted in light of this limitation and given the variable testing suggested instabilities with this variable despite initial indications of statistical significance, the variable was ultimately dismissed from inclusion within the preferred long run model.

## The Global Financial Crisis

The recent global financial crisis (GFC) is likely to explain the large 2008/09 decline evident across all letter volume segments. The difficulty in utilising an empirical approach to capture these effects is compounded by the lack of tractable observations that could provide further insight into how letter volumes would react in the years subsequent to such low levels of economic activity.

Future observations on letter volumes therefore require monitoring to establish whether or not the GFC not only reduced letter volume demand permanently but acted as a catalyst for mailing agents to engage in increased movements away from the traditional mail item as they are forced into rationalising their cost bases in the face of a deteriorating economic climate.

Econometrically Diversified Specifics employ a dichotomous variable approach to quantify the magnitude of this effect in the first instance. However the effects of the GFC should not only attempt to assess a structural break in the data resulting in a permanent downward volume shift in letter volumes but also seek to establish an accelerated movement towards substitutive alternatives should one exist.

Diversified Specifics therefore construct and then employ a slope dummy (defined by the dichotomous variables interaction with the GDP decline) to capture such effects however given the recent proximity of the GFC increased forward observations are required to credibly quantify any accelerated downward trend.

The *ex-ante* forecasts would therefore benefit from increased observations and future updates should note these findings as preliminary statistical tests have shown some evidence that the GFC may have signalled the beginning of the next wave in substitution, consolidation and rationalisation practices amongst mailing agents seeking to rationalise their cost base.

### 3.5.4 PROJECTIONS

Projections on the statistically significant drivers require forward projection within an econometric framework whereby some variables are determined outside the system of equations (i.e. exogenous variables).

Although Diversified Specifics initially derive a set of segmented letter volume forecasts completely endogenising all variables, the forecasts then generated, by treating the volume drivers as exogenous, do benefit from superior insight and intelligence on the prevailing drivers.

For consistency Diversified Specifics has utilised Australia Posts forward projections on the level of economic activity and inflation in an attempt to better inform the forecasting exercise.

Under this framework scenario forecasting becomes particularly important given the recent volatility of the S&P/ASX 200 Consumer Discretionary Index which has been severely affected by the global financial crisis.

Where further market intelligence exists on drivers resting outside the econometric framework, such intelligence should be used to augment segmented forecasts as applicable.

#### 3.5.4.1 Australian Non-Farm GDP

For many recognised institutions forecasting Australian economic growth has been a difficult task over the past eighteen months.

Throughout this period revisions to GDP related growth projections have been both frequent and, at times, substantial as the economy experienced a significant slowdown in activity.

In the development of econometric forecasts within this research undertaking, Diversified Specifics have deferred to forward projections on GDP as generated by Australia Post's internal intelligence (as illustrated in Table 3.5.4.1).

**Table 3.5.4.1**

Projection Name	09/10	10/11	11/12
Australia Post GDP Projections <sup>14</sup>	1.5%	3%	3.5%

<sup>14</sup> As provided by Corporate Strategy, Australia Post.



### 3.5.4.2 Real Price of Other Small Letters

The real price of the small letter volume segments are determined via a combination of (i) Inflationary pressures; (ii) Australia Post pricing related nominal pricing policies; & (iii) Regulatory approval of the proposed nominal price changes.

The Consumer Price Index (CPI) growth forecasts from 2009/10 to 2011/12 utilised within this research undertaking act as the basis for letter volume forecast development and are given in Table 3.5.4.2. (as forecast by Australia Posts internal intelligence).

**Table 3.5.4.2.**

Projection Name	09/10	10/11	11/12
Australia Post CPI Projections <sup>15</sup>	1.75%	2.25%	2.5%

Any real price projections should also be contingent on nominal price increases as determined by Australia Post internal policy and the subsequent approval by the regulator.

The *ex-ante* forecasts generated via the econometric models will also highlight the impact of choosing alternate dates<sup>16</sup> for a nominal price change in the basic postal rate (BPR) from 55 cents to 60 cents (representing a 9.09% nominal price increase).

### 3.5.4.3 Advertising Industry Health Measure

The S&P/ASX 200 Consumer Discretionary Index fell by approximately 35% in both 2007/08 and 2008/09, reaching its lowest level over the examined timeframe in March 2009. Accordingly, the trend in the index has been severely negative in recent times.

It is clear therefore, that the index is currently experiencing extreme levels of volatility reflected by the fact that it encompasses industries that are particularly sensitive to economic cycles.<sup>17</sup>

As such, forecasting growth in the advertising industry in itself remains problematic.

A recently released publication by PricewaterhouseCoopers entitled '*Australian Entertainment & Media Outlook 2009-2013*'<sup>18</sup> claims there is also a structural change occurring within the advertising industry referred to as 'digital migration', in which traditional advertising mediums are being substituted for online and alternative advertising mediums such as pay television.

The impact on direct mail will need to be closely analysed as more data becomes available on digital migration as it does represent a potential threat to future direct mail growth.

The Consumer Discretionary Index has fluctuated considerably since the start of 2000 as evident by a 35.18% decline in the 12 months prior to June 30, 2009. Overall however, the index has decreased at an annual average rate of 8.83% since 2000/01.

Forecasts focusing on the health of the advertising industry in this research undertaking will be contingent upon this lower bound of -8.83% (the annual average decline since 2000/01) and an upper bound of zero.

<sup>15</sup> As provided by Corporate Strategy, Australia Post.

<sup>16</sup> The alternate dates for implementation of a price change to be investigated are April 1, 2010 and July 1, 2010.

<sup>17</sup> Australian Securities Exchange, Weblink:

[http://www.asx.com.au/products/indices/types/sector.htm#consumer\\_discretionary\\_index](http://www.asx.com.au/products/indices/types/sector.htm#consumer_discretionary_index)

<sup>18</sup> PricewaterhouseCoopers LLP, Weblink: <http://www.pwc.com/gx/en/entertainment-media/publications/index.jhtml>

#### 3.5.4.4 Credit Card Growth

Credit card volumes have been growing at an annual average rate of 5.08% since the start of 2000 and by 2.33% in the 12 months prior to June 30, 2009.

In the absence of projections on credit card up-take the alternative is to derive a projection set based upon its statistical association with the level of economic activity.

The short run component of the Vector Error Correction Model for Other Small Letter volumes asserts an association between these two variables<sup>19</sup> however this is also reinforced within the literature.

*“Users also responded to the external financial and economic conditions. These saw two types of payment trends – short-term cyclical declines amongst certain instruments and channels as a result of deteriorating economic conditions and a continuation of long-term structural moves away from paper payments and towards card and electronic payments.”<sup>20</sup>*

Further, the US department of commerce states:

*“Credit card penetration is positively correlated with economic growth and exports.”<sup>21</sup>*

Utilising these findings Diversified Specifics enter Non-farm GDP into the system of equations as an exogenous variable though its statistically significant linkage in explaining credit card volume fluctuations.

Then, under the prevailing framework, credit cards volumes are treated as an endogenous variable, projected within the model, with those projections then facilitating the generation of Other small letter volume projections.

---

<sup>19</sup> See Appendix B.1. of this document.

<sup>20</sup> Australian Payments Clearing Association, Weblink:

[http://www.apca.com.au/AR2009/pdf/apca\\_ar2009\\_industry\\_issues\\_and\\_debates.pdf](http://www.apca.com.au/AR2009/pdf/apca_ar2009_industry_issues_and_debates.pdf)

<sup>21</sup> Credit Card Market: Economic Benefits and Industry Trends, Department of Commerce, USA, Weblink: <http://www.ita.doc.gov/td/finance/publications/creditcards.pdf>

## 4.0 MODEL DEVELOPMENT



#### 4.1. VECTOR ERROR CORRECTION MODELING

---

The vector error correction model (VECM) provides a general and flexible framework in which to capture the dynamics of letter volume fluctuations. The key feature underpinning this class of models is that it decomposes letter volumes into long run and short run behavioural demand effects.

This contrasts with the ordinary least squares (OLS) static models which essentially focus on long run behavioural patterns. From a forecasting perspective whilst capturing long run dynamics provides the overall direction of the underlying series it fails to capture the short run dynamics by construction as distinct from the VECM.

This VECM framework therefore rests on the threshold of statistical analysis representing the most advanced techniques in econometrics that are aimed at modelling dynamic processes within an economy.

A further advantage of this dynamic framework is that whilst baseline forecasts are generated assuming that all variables in the system are allowed to interact with each other (i.e. are endogenous) it is also possible to impose particular assumptions/projections on some of the key drivers of segmented letter volumes to embed further insight into the resultant forecasts.

This is highlighted in Section 5 of this document where forecasts under a number of scenarios on the key drivers are presented.

Given previous segmented letter volume demand studies focused on long run explanatory associations, the dynamic framework model now subsumes the static OLS model and all subsequent interpretations within this document will focus on the VECM.

## 4.2. VECTOR ERROR CORRECTION COMPONENTS

---

Prior to interpreting the estimated elasticities pertaining to each segmented letter volume model a brief compositional overview of the VECM requires discussion.

Broadly speaking, the VECM consists of three elements:

- 1) The Long Run component;
- 2) The Error Correction component (i.e. the disequilibrium); &
- 3) The Short Run component.

### The Long Run Component

The long run component of the VECM specifies the overall associations between postal volumes and their respective drivers. As the variables are measured in natural logarithms the pertinent parameters are directly interpretable as long run elasticities.<sup>22</sup>

### The Error Correction Component

The error correction parameters provide information on how the variables in the model adjust to the long run equilibrium as given by the long run component of the model. These parameters also provide information on the relative importance of the key adjusting mechanisms.

Consider, for example, the Other Small Letter volume VECM (reproduced in Appendix B.1 of this document). The first error correction parameter given (-1.336870) suggests that when Other small letter volumes are above the long run equilibrium volumes decrease (reflecting the negative sign) towards the long run equilibrium. This behaviour is perfectly consistent with the presence of cointegration.

Moreover, inspection of the t-statistic on the parameter estimate (-6.76395) is statistically significant highlighting that in a statistical sense this is a key mechanism that re-establishes long run equilibrium.

When considering the error correction parameters of the other two mechanisms (for credit card volumes & real price) these parameter estimates are positive and negative respectively. However, both of these parameter estimates are also statistically insignificant at the 5% level (-1.47918 & -0.20108) suggesting these two variables are not the main drivers in restoring long run equilibrium.

Formerly, these two variables are known as weakly exogenous and so it is Other Small Letter volumes within this system of equations that is the main driver in restoring the long run equilibrium. Intuitively, this implies credit card volumes and real price rest outside the control of Australia Post thereby leaving Other Small Letter volumes as the relevant mechanism that adjusts to achieve equilibrium in the long run.

---

<sup>22</sup> This elasticity is defined as:  $(dY/Y)/(dX/X) = [(dY/dX)(X/Y)]$  and, abiding with convention, in this research undertaking all estimated elasticities are evaluated at the mean.

## The Short Run Component

The short run components of the VECM correspond to the lagged changes on the variables in the system. For the Other Small Letter volume VECM there are six parameters in each of the three equations corresponding to a total of eighteen parameter estimates corresponding to the short run dynamics.

These short run dynamics control the dynamic mechanisms when moving from disequilibrium to equilibrium. Recall however the overarching dynamics are controlled by the error correction parameter estimates as discussed in the second component.

Given the large number of short run parameter estimates it is indeed difficult to interpret these parameters from inspection of their estimates. With regard to price however, the short run response of Other Small Letter volumes to changes in the real price is  $-0.067547$ .

This estimate is smaller in magnitude than the long run elasticity highlighting volume adjustments in the short run are much smaller than the long run effects. Furthermore not only are the short run adjustments smaller than the long run but are they are also statistically insignificant adding further weight to the suggestion that volumes do not adjust quickly to movements in real prices.

Additional explanatory insight could therefore be provided by a deeper inspection of the impulse responses however this undertaking sits outside forecasting objectives of this research project.

### 4.3.1 Other Small Letter Volumes

The Other Small Letter model explains 91.9% of the total quarterly variation in Other Small Letter volumes over the December 1999 to June 2009 timeframe.<sup>23</sup>

Presented below are the historical (December 1999 to June 2009) demand drivers (ranked in order of explanatory potency) together with the relevant demand elasticity (where applicable):

#### 1. Credit Card Volumes:

As growth in credit card volumes continues, transactional bill payments that were formerly the domain of cheques and money orders which require a physical letter are increasingly being replaced by internet and telephone payment alternatives.

**Elasticity**<sup>24</sup>: A 1% increase in credit card volumes was associated with a 0.65% decrease in Other Small Letter volumes over the long run.

#### 2. Real Price:

The real cost (i.e. price adjusted for inflationary effects) of sending Other Small Letter mail is inversely related to demand. Price changes in the examined time frame have been significantly associated with volume responses in the contrary direction.

**Elasticity**: A 1% increase in the real price of sending Other Small Letters was associated with a 0.49% decrease in Other Small Letter volumes over the long run.

*The non-market based volume drivers have been excluded from the above elasticity summary.  
(Refer to the drivers as listed in Section 5 for greater detail).*

---

<sup>23</sup> Based upon Adjusted R-squared calculations:

$$\bar{R}^2 = 1 - (1 - R^2) \frac{T - 1}{T - K - 1} \text{ where } R^2 = \frac{\text{Explained sum of squares}}{\text{Total of sum of squares}} = 1 - \frac{\sum e_i^2}{\sum (Y_i - \bar{Y})^2}$$

<sup>24</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 document it is assumed all other factors are held constant.

### 4.3.2 PreSort Barcoded Small Letter Volumes

The PreSort Barcoded Small Letter volume model explains 92.8% of the total quarterly variation in PreSort Barcoded Small Letter volumes over the examinable timeframe i.e. from July 1995 to June 2009.

Presented below are the historical (July 1995 to June 2009) demand drivers (ranked in order of explanatory potency) together with the relevant demand elasticity (where applicable).

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

Growth in Real GDP (Non-farm) was statistically significantly associated with growth in PreSort volumes over the examined time frame. This association emphasises the importance of economic activity to Non-promotional and Promotional PreSort mailings.

**Elasticity:** A 1% increase in Real GDP (Non-farm) was associated with a 0.76% increase in PreSort Barcoded Small Letter volumes.

#### 2. Advertising Industry Health Measure:

Changing levels of activity within the advertising industry represented a statistically significant explainer of PreSort Barcoded Small Letter volume fluctuations. The Consumer Discretionary Index, employed in this study to measure such effects, has historically been associated with the Promotional component of PreSort Barcoded Small Letter volumes.

**Elasticity:** A 1% increase in the Consumer Discretionary Index (i.e. the measure of health of the advertising industry) was associated with a 0.16% increase in PreSort Barcoded Small Letter volumes.

*The non-market based volume drivers have been excluded from the above elasticity summary.  
(Refer to the drivers as listed in Section 5 for greater detail).*

### 4.3.3 Other Large Letter Volumes

The Other Large Letter model explains 72.1% of the total quarterly variation in Other Large Letter volumes over the September 2001 to June 2009 timeframe.

Presented below is the historical (September 2001 to June 2009) demand driver 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 1% increase in Real GDP (Non-farm) was associated with a 0.24% increase in Other Large Letter volumes.

*The non-market based volume drivers have been excluded from the above elasticity summary.  
(Refer to the drivers as listed in Section 5 for greater detail).*



### 4.3.3 PreSort Barcoded Large Letter Volumes

The PreSort Barcoded Large Letter model explains 88.8% of the total quarterly variation in PreSort Barcoded Large Letter volumes over the July 1995 to June 2009 timeframe.

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 Real GDP (Non-farm).

**Elasticity:** A 1% increase in Real GDP (Non-farm) was associated with a 0.91% increase in PreSort Barcoded Large Letter volumes.

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 1% increase in the Consumer Discretionary Index (i.e. the measure of health of the advertising industry) was associated with a 0.18% increase in PreSort Barcoded Large Letter volumes.

*The non-market based volume drivers have been excluded from the above elasticity summary.  
(Refer to the drivers as listed in Section 5 for greater detail).*

## 5.0 EX-ANTE FORECASTS



## 5.1 CAVEATS ON ECONOMETRIC FORECASTS

---

It is important to re-iterate that the use of these empirical models to forecast segmented letter volumes must be conducted with all due caution.

As the *ex-ante* forecasts generated are based upon econometric modelling, they depend heavily upon:

- Accurately forecasting future growth rates for each of the exogenous drivers;
- An assumption that prior statistical associations detected by the modelling continues to hold over the forecast period (which may not always be the case);
- An assumption of comprehensiveness governing the statistically significant segmented letter volume drivers. That is, there are other variables logically associated with each segment however significant variation over the sampled timeframe may not have been evident. As a consequence these drivers tend to be excluded from the econometric models; &
- The global and national economy remaining similar to that of the sampled timeframe.

The methodology employed acknowledges these limitations and the impossibility of embedding all possible contingencies within the *ex-ante* forecast estimates.

It is therefore recommended that any interpretation of the forecast results generated by these models be augmented by further internal and market intelligence.

This also suggests a need for ongoing refinements and research to ensure an adequate currency of both the statistical associations and forecasts produced via the econometric models.

## 5.2 OTHER SL FORECAST SCENARIOS

Other Small Letter *ex-ante* forecasts will be presented in this section under a variety of scenarios.

As highlighted in the previous section, the statistically significant Other Small Letter volume drivers over the 1999Q3 - 2009Q2 timeframe are:

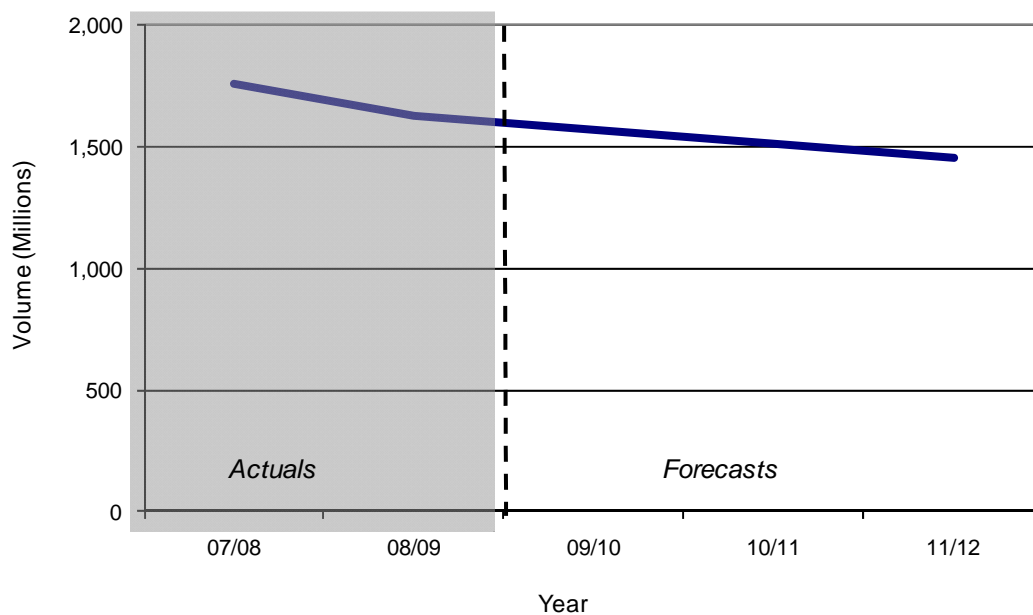
- Substitution: Captured by credit card penetration as an enabler of alternative bill payment technologies such as the phone and internet.
- Price: A combination of inflationary real price declines and nominal price increases.
- The onset of the global financial crisis acted as a catalyst for a permanent reduction in volumes.
- The closure of the Unbarcoded PreSort service resulted in migration towards Other Small Letters.

### Other Small Letter Forecast A:

In this case the Vector Error Correction Model endogenises all variables:

Other Small Letter Forecasts A: Endogenise All Variables				
	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	1,757.4	-	1,756.0	
08/09	1,639.8	-	1,631.0	
09/10	1,580.6	-3.61%		1572.0
10/11	1,519.0	-3.90%		1510.8
11/12	1,463.4	-3.66%		1455.5

**Other Small Letter Volumes**  
Actuals & Forecasts - All variables endogenised



**Other Small Letter Forecast B:**

Other Small Letter Forecasts B: Price Exogenous (Without a nominal price increase)				
	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	1,757.4	-	1,756.0	
08/09	1,639.8	-	1,631.0	
09/10	1,610.3	-1.80%		1601.6
10/11	1,597.6	-0.79%		1589.0
11/12	1,588.9	-0.54%		1580.3

**Underlying Assumptions:**

Projected GDP growth: 09/10 1.5%; 10/11 3%; 11/12 3.5% (included as a variable exogenous to the system)

CPI forecasts resulting in real price changes of: -1.75%; -2.25% & -2.5% over 09/10, 10/11 & 11/12 respectively.

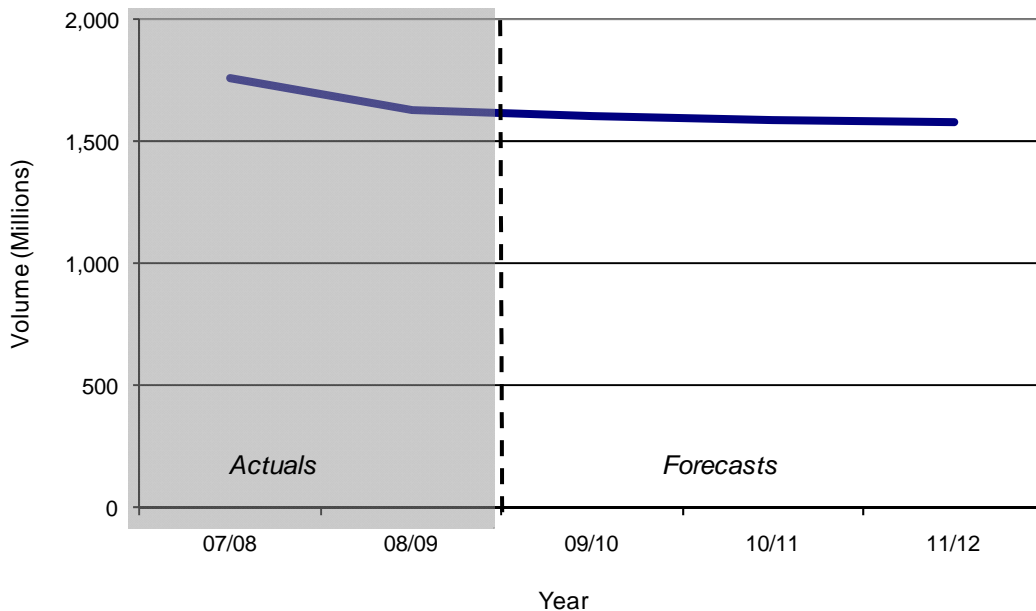
No nominal price increases.

Credit card growth is derived endogenously via the significant association with GDP within the error correction component of the model.

The effects of the economic downturn have lowered volumes since 2008Q4.

Red values indicate fitted values.

**Other Small Letter Volumes**  
Without a nominal price increase



**Other Small Letter Forecast C:**

Other Small Letter Forecasts C: Price Exogenous (With the Nominal Price Increase April 1 2010)				
	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	1,757.4	-	1,756.0	
08/09	1,639.8	-	1,631.0	
09/10	1,610.3	-1.80%		1601.6
10/11	1,520.6	-5.57%		1512.4
11/12	1,516.0	-0.30%		1507.8

**Underlying Assumptions:**

Projected GDP growth: 09/10 1.5%; 10/11 3%; 11/12 3.5% (included as a variable exogenous to the system)

CPI forecasts resulting in real price changes of: -1.75%; -2.25% & -2.5% over 09/10, 10/11 & 11/12 respectively.

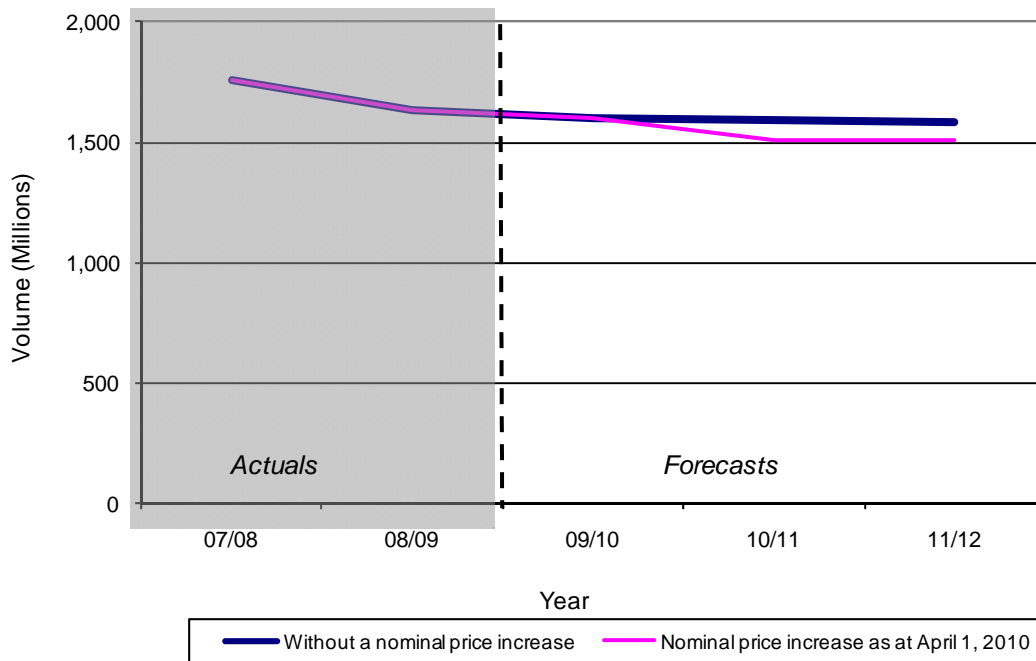
The 2009/10 real price variable incorporate a 9.09% nominal price increase as at April 1, 2010

Credit card growth derived endogenously via the significant association with GDP within the error correction component of the model.

The effects of the economic downturn have lowered volumes since 2008Q4.

Red values indicate fitted values

**Other Small Letter Volumes**  
Effects of a price increase as at April 1, 2010



**Other Small Letter Forecast D:**

Other Small Letter Forecasts D: Price Exogenous (With the Nominal Price Increase July 1 2010)				
	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	1,757.4	-	1,756.0	
08/09	1,639.8	-	1,631.0	
09/10	1,610.3	-1.80%		1601.6
10/11	1,536.7	-4.57%		1528.4
11/12	1,517.9	-1.22%		1509.7

**Underlying Assumptions:**

Projected GDP growth: 09/10 1.5%; 10/11 3%; 11/12 3.5% (included as a variable exogenous to the system).

CPI forecasts resulting in real price changes of: -1.75%; -2.25% & -2.5% over 09/10, 10/11 & 11/12 respectively.

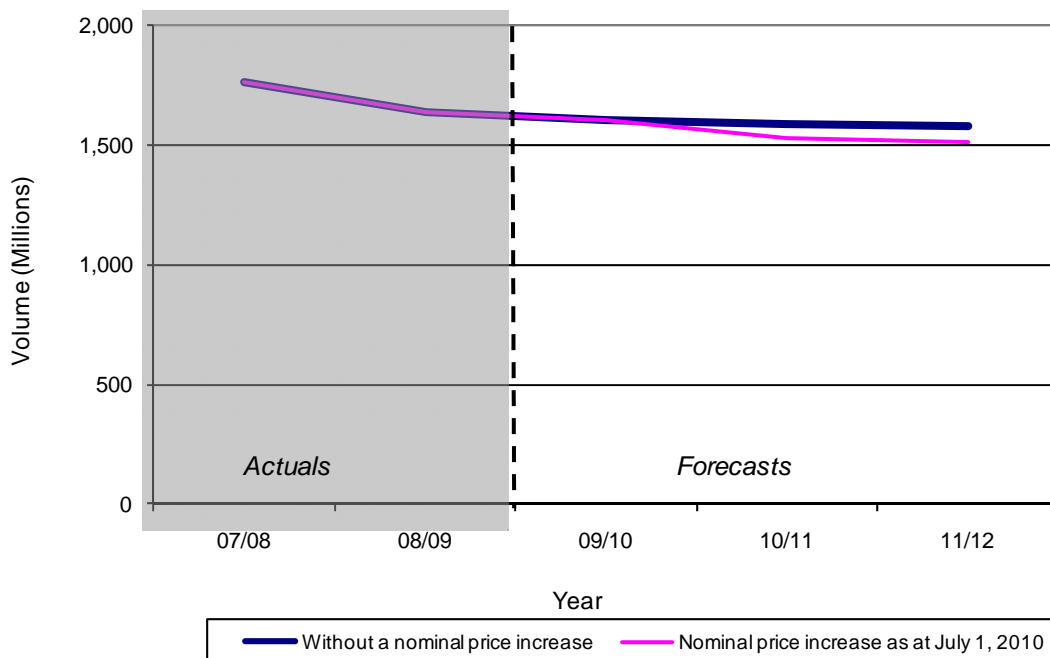
The real price variable includes a 9.09% nominal price increase as at July 1, 2010.

Credit card growth derived endogenously via the significant association with GDP within the error correction component of the model.

The effects of the economic downturn have lowered volumes since 2008Q4.

Red values indicate fitted values

**Other Small Letter Volumes**  
Effects of a price increase as at July 1, 2010



## 5.2 PRESORT BARCODED SL FORECAST SCENARIOS

PreSort Barcoded Small Letter *ex-ante* forecasts will be presented in this section under a variety of scenarios.

As highlighted in Section 4 of this document, the statistically significant PreSort Barcoded Small Letter volume drivers over the 1995Q3 to 2009Q2 timeframe are:

- Domestic Non-farm economic activity: Bulk periodic letters (e.g. bills and statements) and bulk ad-hoc standard size letters from the major mailers are associated with movements in the general health of the economy.
- The health of the advertising industry: Direct mail is assumed to constitute an important part of the marketers' overall promotional alternatives.
- The introduction of barcoding technology in letter mail processing in October 1999, together with its associated reduction in minimum lodgement quantities from 2,500 to 300 items, migrated volumes from Other Small Letters to PreSort Barcoded Small Letters.

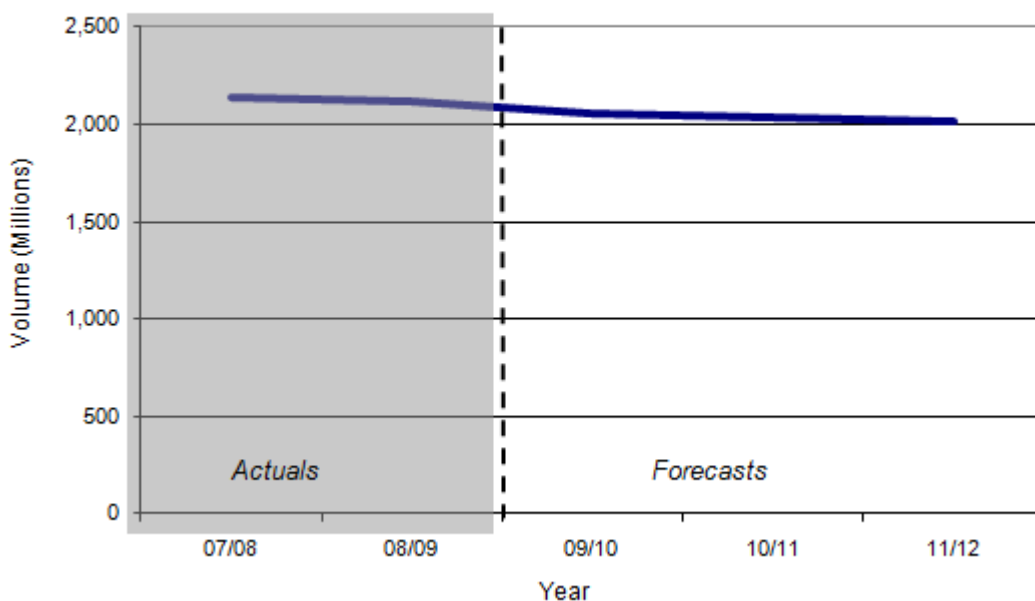
### PreSort Barcoded Small Letter Forecast A:

In this case the Vector Error Correction Model endogenises all variables:

#### PreSort Barcoded Small Letter Forecasts A: Endogenise All Variables

	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	2,117.2	-	2,135.4	
08/09	2,114.2	-	2,112.5	
09/10	2,055.2	-2.79%		2053.6
10/11	2,032.1	-1.12%		2030.6
11/12	2,018.3	-0.68%		2016.7

#### PreSort Barcoded Small Letter Volumes Actuals & Forecasts - All variables endogenised





### PreSort Barcoded Small Letter Forecast B:

#### PreSort Barcoded Small Letter Forecasts B: Based on zero growth in the Advertising Industry

	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	2,117.2	-	2,135.4	
08/09	2,114.2	-	2,112.5	
09/10	2,055.0	-2.80%		2053.4
10/11	2,046.5	-0.41%		2044.9
11/12	2,063.4	0.83%		2061.8

#### Underlying Assumptions:

Projected GDP growth: 09/10 1.5%; 10/11 3%; 11/12 3.5%

Consumer discretionary Index growth rate set to zero from 09/10 to 11/12.

Red values indicate fitted values

### PreSort Barcoded Small Letter Forecast C:

#### PreSort Barcoded Small Letter Forecasts C: Based on an 8.83% annual decline in the Advertising Industry

	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	2,117.2	-	2,135.4	
08/09	2,114.2	-	2,112.5	
09/10	2,051.4	-2.97%		2049.8
10/11	2,027.6	-1.16%		2026.0
11/12	2,022.3	-0.26%		2020.8

#### Underlying Assumptions:

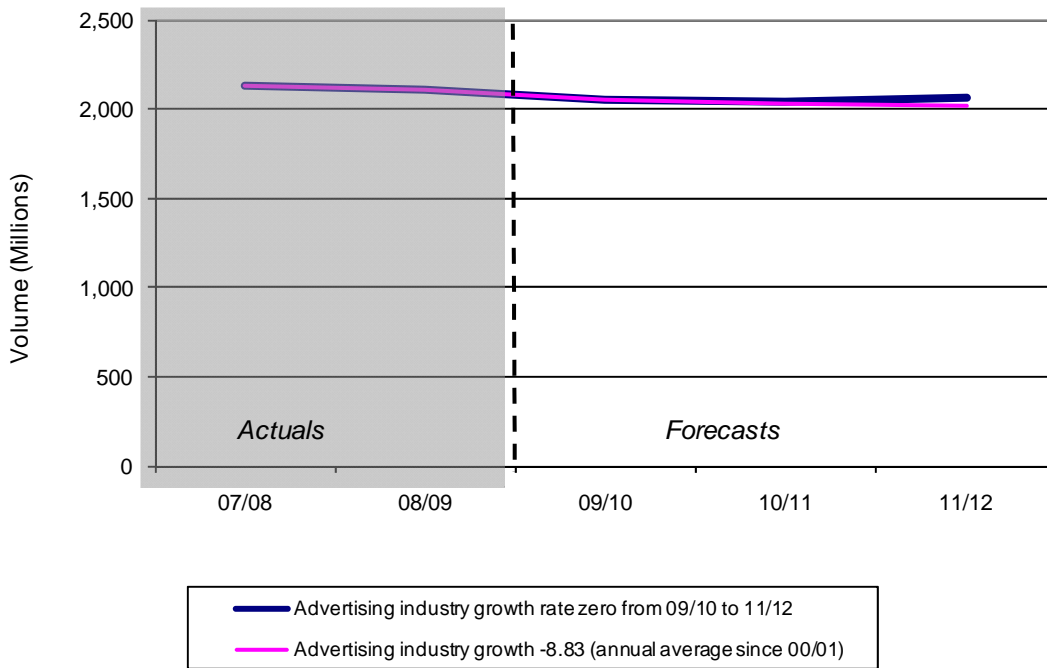
Projected GDP growth: 09/10 1.5%; 10/11 3%; 11/12 3.5%

Consumer discretionary index set at the annual average decline of -8.83 since 2000/01.

Red values indicate fitted values

A comparative chart of PreSort Barcoded Small Letter forecasts for scenarios B and C is presented below:

### PreSort Barcoded Small Letter Volumes Advertising industry sensitivity analysis



### 5.3 OTHER LL FORECAST SCENARIOS

Other Large Letter *ex-ante* forecasts will be presented in this section under a variety of scenarios.

As highlighted in Section 4 of this document, the statistically significant Other Large Letter volume drivers over the 2001Q3 to 2009Q2 timeframe are:

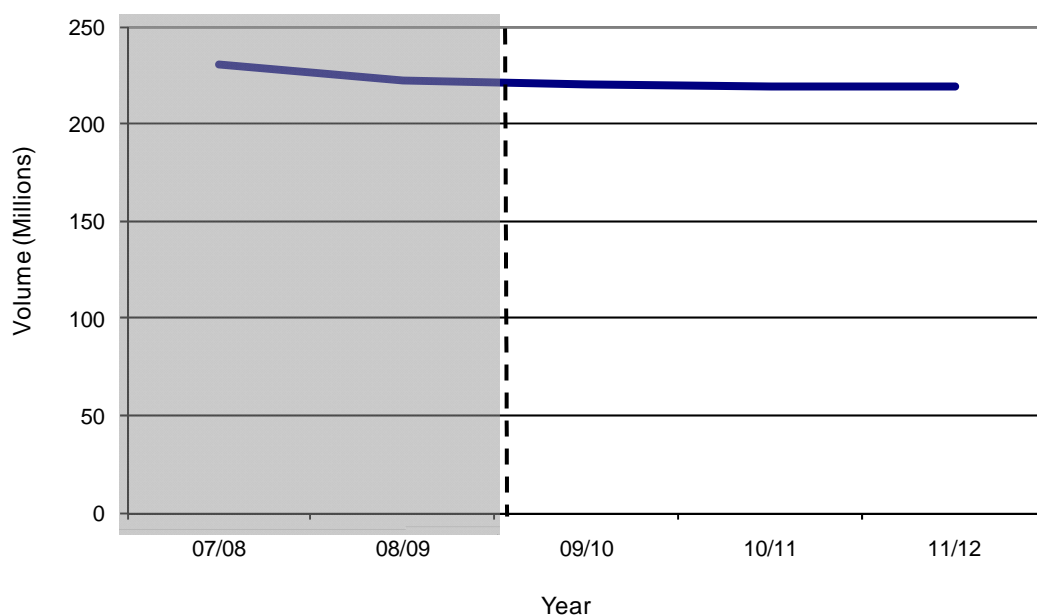
- Domestic Non-farm economic activity: Bulk commercial large letters emanating from the major mailers are associated with fluctuations in the general health of the economy.
- The onset of the global financial crisis acted as a catalyst for a permanent reduction in Other Large Letter volumes.
- The closure of the Unbarcoded PreSort service resulted in a migration of volumes towards the Other Large Letter volume segment.

#### Other Large Letter Forecast A:

In this case the Vector Error Correction Model endogenises all variables:

Other Large Letter Forecasts A: Endogenise All Variables				
	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	234.2	-	230.7	
08/09	221.8	-	222.3	
09/10	219.7	-0.95%		220.1
10/11	218.6	-0.47%		219.1
11/12	218.7	0.02%		219.2

**Other Large Letter Volumes**  
Actuals & Forecasts - All variables endogenised



#### Other Large Letter Forecast B:

**Other Large Letter Forecasts B:  
GDP Exogenous**

	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	234.2	-	230.7	
08/09	221.8	-	222.3	
09/10	220.2	-0.71%		220.7
10/11	220.4	0.10%		220.9
11/12	222.4	0.90%		222.9

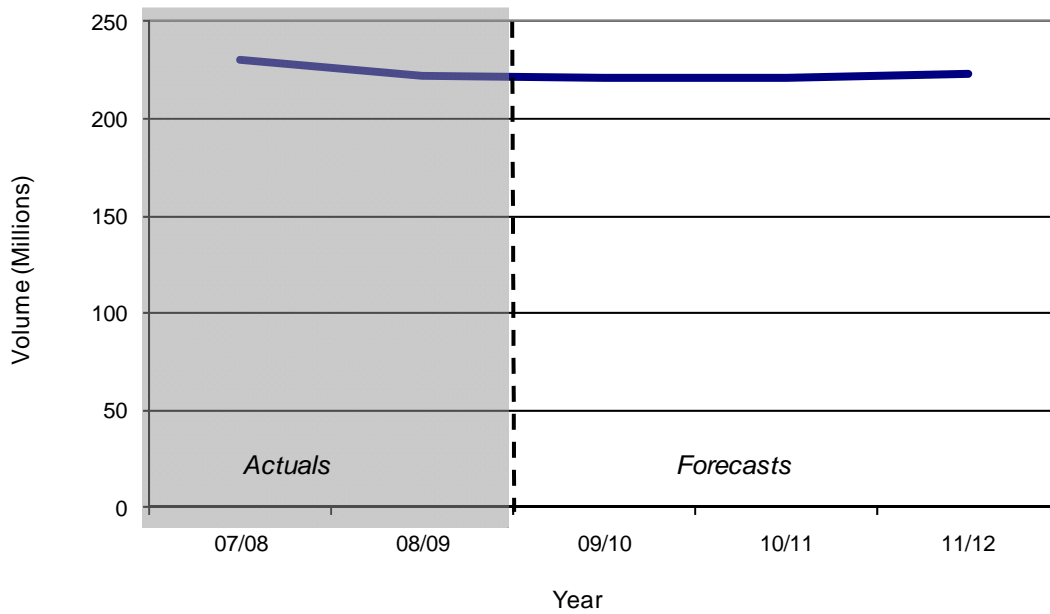
**Underlying Assumptions:**

AP assumptions on GDP growth: 09/10 1.5; 10/11 3; 11/12 3.5

The effects of the economic downturn have lowered volumes since 2008Q4.

Red values indicate fitted values

**Other Large Letter Volumes  
Actuals & Forecasts - GDP Exogenous**



## 5.4 PRESORT BARCODED LL FORECAST SCENARIOS

PreSort Barcoded Large Letter *ex-ante* forecasts will be presented in this section under a variety of scenarios.

As highlighted in Section 4 of this document, the statistically significant PreSort Barcoded Large Letter volume drivers over the 1995Q3 to 2009Q2 timeframe are:

- Domestic Non-farm economic activity: Fluctuations in non-standard size ad-hoc letters are associated with movements in the general health of the economy.
- The health of the advertising industry: Non-standard sized direct mail is assumed to constitute an important part of marketers' overall promotional alternatives.
- The introduction of barcoding technology in letter mail processing in October 1999, together with its associated reduction in minimum lodgement quantities from 2,500 to 300 items, migrated volumes from Other Small Letters to PreSort Barcoded Small Letters.

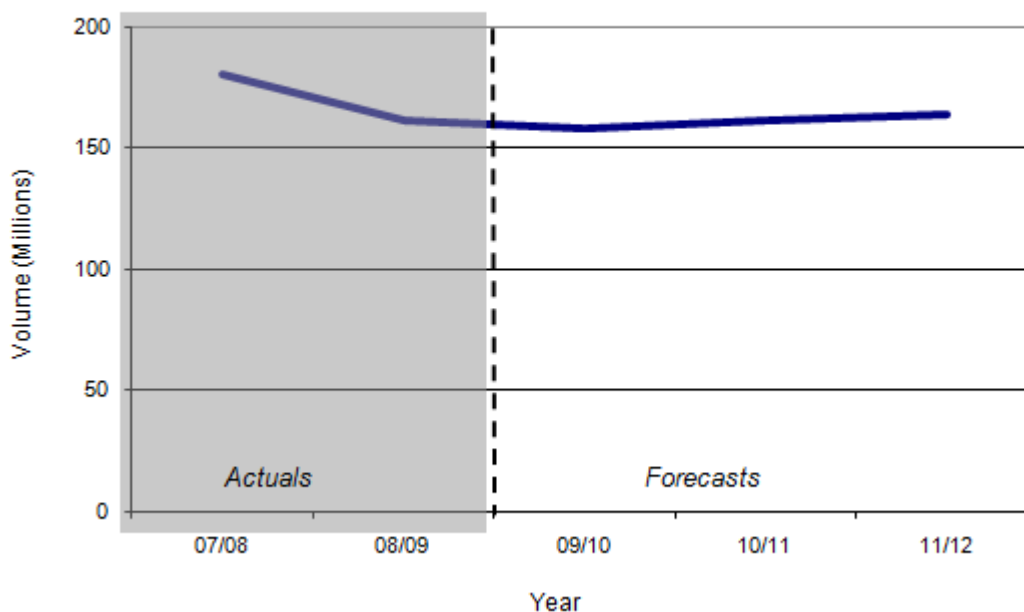
### PreSort Barcoded Large Letter Forecast A:

In this case the Vector Error Correction Model endogenises all variables:

#### PreSort Barcoded Large Letter Forecasts A: Endogenise All Variables

	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	187.6	-	180.5	
08/09	162.0	-	161.6	
09/10	158.7	-2.05%		158.3
10/11	161.9	2.00%		161.5
11/12	164.4	1.52%		163.9

#### PreSort Barcoded Large Letter Volumes Actuals & Forecasts - All variables endogenised



### PreSort Barcoded Large Letter Forecast B:

**PreSort Barcoded Large Letter Forecasts B:  
Based on zero growth in the Advertising Industry**

	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	187.6	-	180.5	
08/09	162.0	-	161.6	
09/10	154.5	-4.62%		154.1
10/11	154.7	0.13%		154.3
11/12	157.8	1.98%		157.4

**Underlying Assumptions:**

Projected GDP growth: 09/10 1.5%; 10/11 3%; 11/12 3.5%.

Consumer discretionary index growth rate set to zero for 09/10 to 11/12.

Red values indicate fitted values

**PreSort Barcoded Large Letter Forecast C:**

**PreSort Barcoded Large Letter Forecasts C:  
Based on an 8.83% annual decline in the Advertising Industry**

	Econometric Forecast Volume	Econometric Forecast % Growth	Actual Volume	Econometric Forecast Growth Applied to Actual
07/08	187.6	-	180.5	
08/09	162.0	-	161.6	
09/10	153.1	-5.54%		152.6
10/11	148.4	-3.03%		148.0
11/12	146.8	-1.11%		146.4

**Underlying Assumptions:**

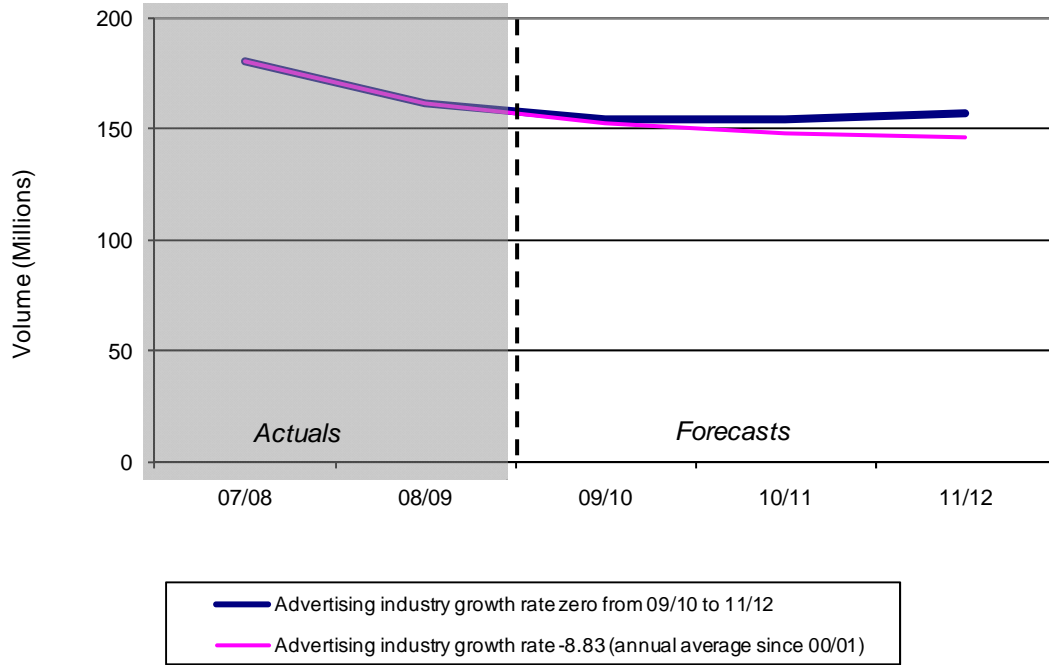
Projected GDP growth: 09/10 1.5%; 10/11 3%; 11/12 3.5%.

Consumer discretionary index set at the annual average decline of -8.83 since 2000/01.

Red values indicate fitted values

A comparative chart of PreSort Barcoded Large Letter forecasts for scenarios B and C is presented below:

### PreSort Barcoded Large Letter Volumes Advertising industry sensitivity analysis



# APPENDIX A





**Internal Australia Post Data**

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

- Domestic Small and Large Letter Volumes;
- Small and Large Letter Delivery Performance; &
- Money Order Volumes.

**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 drivers in relation to segment-specific volumes.

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

Volume Predictor	Variable	Series Timeframe Utilised (Data Frequency)	Data Source
Real Price of Other Small Letters	Real Price of Other Small Letters	September 1995 to June 2009 – Quarterly series	Nominal price of Other Small Letters: Australia Post; CPI: ABS Cat. No. 6401.0 TABLES 1 and 2. All Groups, Index Numbers and Percentage Changes , Consumer Price Index, Australian Bureau of Statistics
Real Price of PreSort Barcoded Small Letters	Real Price of PreSort Barcoded Small Letters	September 1995 to June 2009 – Quarterly series	Nominal price of PreSort Barcoded Small Letters: Australia Post; CPI: ABS Cat. No. 6401.0 TABLES 1 and 2. All Groups, Index Numbers and Percentage Changes , Consumer Price Index, Australian Bureau of Statistics
Australian Non-farm GDP	Australian Non-farm GDP	September 1995 to June 2009 – 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
Money Order Volumes	Money Order Volumes	May 1994 to June 2009 – Monthly series	Australia Post
Cheque Volume	Cheque Volume	January 2002 to June 2009 – Monthly series	Total Number of Cheques, Cheques and Direct Entry Payments – C6, Reserve Bank of Australia (RBA).
Credit Card Volumes	Credit Card Volumes	July 1995 to June 2009 – Monthly series	Number of Accounts, Credit and Charge Card Statistics - C1, RBA

Volume Predictor	Variable	Series Timeframe Utilised (Data Frequency)	Data Source
Estimated Australian Population	Estimated Australian Population	September 1995 to June 2009 – Quarterly series	Estimated Resident Population (ERP), Cat. No. 3101.0 Table 1. Population Change, Summary - Australia ('000), Australian Bureau of Statistics
Advertising Industry Health Measure	Media Index	September 1995 to June 2009 – Quarterly series	S&P/ASX 200 Consumer Discretionary Index, Macquarie Edge.
Consumer Sentiment	Consumer Sentiment Index	July 1995 to June 2009 – Monthly series	Indicators of Spending and Confidence, Westpac-Melbourne Institute consumer sentiment index, Reserve Bank of Australia.
Business Confidence	NAB Business Confidence Index	September 1995 to June 2009 – Quarterly series	Net balance (NSA)+100 (to avoid negative values), NAB business confidence index, Reserve Bank of Australia.
September 11	The September 11 Terrorist attacks	Dichotomous Variable	Internally constructed variable – Diversified Specifics
Federal Elections	Federal Election	Dichotomous Variable	Internally constructed variable – Diversified Specifics
State Elections	State Election	Dichotomous Variable	Internally constructed variable – Diversified Specifics
Referendums	Referendum	Dichotomous Variable	Internally constructed variable – Diversified Specifics
Barcoding Introduction	Introduction of Barcoding Technology	Dichotomous Variable	Internally constructed variable – Diversified Specifics
Closure of the Unbarcoded PreSort Service	Unbarcoded PreSort Service and Go Mail Discontinuation	Dichotomous Variable	Internally constructed variable – Diversified Specifics
Olympic Games	Olympic Games – Sydney Olympic Games	Dichotomous Variable - September 2000	Internally constructed variable – Diversified Specifics
Real Price of Other Large Letter Volumes	Real Price of Other Large Letter Volumes	March 1985 to June 2009 – 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.
Large Letter Delivery Performance	Large Letter Delivery Performance	June 1998 to June 2009 – Monthly series	Letters Group, Australia Post
Small Letter Delivery Performance	Small Letter Delivery Performance	June 1998 to June 2009 – Monthly series	Letters Group, Australia Post

Volume Predictor	Variable	Series Timeframe Utilised (Data Frequency)	Data Source
Information Media and Telecommunications Industry GDP	Information Media and Telecommunications Industry GDP	September 1995 to June 2009 – Quarterly series	Information media and telecommunications (J), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Finance and Insurance Services Industry GDP	Finance and Insurance Services Industry GDP	September 1995 to June 2009 – Quarterly series	Finance and insurance services (K), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Public Administration and Safety Industry GDP	Public Administration and Safety Industry GDP	September 1995 to June 2009 – Quarterly series	Public administration and safety (O), 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 2009 – Quarterly series	Retail trade (G), 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 2009 – 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 Care and Social Assistance Industry GDP	Health Care and Social Assistance Industry GDP	September 1995 to June 2009 – Quarterly series	Health care and social assistance (Q), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Education and Training Industry GDP	Education and Training Industry GDP Segment	September 1995 to June 2009 – Quarterly series	Education and training (P), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Real Price of PreSort Large Letters	Real Price of PreSort Barcoded Large Letters	September 1995 to June 2009 – 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	September 1995 to June 2009 – Quarterly series	15 Pulp, paper and converted paper product manufacturing, ABS Producer Price Index Table 10 and 11 Cat Number 642702, Australian Bureau of Statistics
Paper as an Input Cost	Paper as an Input Cost for Direct Mail	September 1995 to June 2009 – Quarterly series	1523 Paper stationery manufacturing, ABS Producer Price Index Table 10 and 11 Cat Number 642704, Australian Bureau of Statistics
Economic Downturn	Economic Downturn	Dichotomous Variable	Internally constructed variable – Diversified Specifics

# APPENDIX B



## KEY STATISTICAL OUTPUTS

---

The methodological approach adopted sought to utilise the most up-to-date set of information on establishing the long run Ordinary Least Squares (OLS) models. Hence the timeframe for their development extends to 2009Q3. However, to conform with the requirement of *ex-ante* forecasts on a financial year basis the subsequent development of the vector error correction models are developed utilising data until 2009Q2.

The preferred statistical models as generated via the research methodology are as follows:

### B.1 Other Small Letter Volumes

#### Static Model

The long-run model is:

$$\text{Insadjot}(t) = a + b \text{Insadjcr}(t) + c \text{Lnrealpr}(t) + d \text{closfth}(t) + f \text{econdown}(t) + e(t)$$

Given by the following output:

Dependent Variable: LNSADJOT				
Method: Least Squares				
Date: 02/17/10 Time: 11:50				
Sample: 1999Q4 2009Q3				
Included observations: 40				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.76045	0.439214	26.77614	0.0000
LNSADJCR	-0.660078	0.053424	-12.35554	0.0000
LNREALPR	-0.477334	0.086136	-5.541613	0.0000
CLOSOFTH	0.098891	0.013139	7.526575	0.0000
ECONDOWN	-0.064616	0.014702	-4.395170	0.0001
R-squared	0.921844	Mean dependent var	6.143741	
Adjusted R-squared	0.912912	S.D. dependent var	0.075633	
S.E. of regression	0.022320	Akaike info criterion	-4.650214	
Sum squared resid	0.017436	Schwarz criterion	-4.439104	
Log likelihood	98.00429	Hannan-Quinn criter.	-4.573884	
F-statistic	103.2059	Durbin-Watson stat	1.798671	
Prob(F-statistic)	0.000000			

## Dynamic Model

The long-run cointegrating equation is:

$$\text{Insadjot}(t) = 11.75849 - 0.654158 \text{Insadjcr}(t) - 0.490097 \text{Lnrealpr}(t) + e(t)$$

VECM (with D(LNSADJNO(-1)) as an exogenous variable):

Vector Error Correction Estimates			
Date: 02/17/10 Time: 22:45			
Sample: 1999Q4 2009Q2			
Included observations: 39			
Standard errors in ( ) & t-statistics in [ ]			
Cointegrating Eq:	CointEq1		
LNSADJOT(-1)	1.000000		
LNSADJCR(-1)	0.654158 (0.03090) [ 21.1734]		
LNREALPR(-1)	0.490097 (0.04771) [ 10.2727]		
C	-11.75849		
Error Correction:	D(LNSADJOT)	D(LNSADJCR)	D(LNREALPR)
CointEq1	-1.336870 (0.19765) [-6.76395]	0.147211 (0.09952) [ 1.47918]	-0.061079 (0.30376) [-0.20108]
D(LNSADJOT(-1))	0.182211 (0.14275) [ 1.27644]	2.08E-05 (0.07188) [ 0.00029]	0.018501 (0.21939) [ 0.08433]
D(LNSADJOT(-2))	0.118625 (0.11009) [ 1.07754]	-0.055809 (0.05543) [-1.00677]	0.006724 (0.16919) [ 0.03974]
D(LNSADJCR(-1))	1.012477 (0.41009) [ 2.46894]	-0.145646 (0.20649) [-0.70533]	-0.360876 (0.63025) [-0.57260]
D(LNSADJCR(-2))	0.950966 (0.36948) [ 2.57380]	0.096547 (0.18605) [ 0.51894]	-0.954398 (0.56784) [-1.68075]
D(LNREALPR(-1))	-0.067547 (0.13517) [-0.49973]	-0.021983 (0.06806) [-0.32299]	-0.139223 (0.20773) [-0.67020]
D(LNREALPR(-2))	0.020168 (0.13841) [ 0.14571]	0.022759 (0.06969) [ 0.32656]	-0.183130 (0.21272) [-0.86091]
C	-0.116517 (0.01688) [-6.90366]	0.022148 (0.00850) [ 2.60611]	-0.019849 (0.02594) [-0.76524]

CLOSOFTH	0.123694 (0.02033) [ 6.08367]	-0.016810 (0.01024) [-1.64196]	0.029957 (0.03125) [ 0.95870]
ECONDOWN	-0.036595 (0.01601) [-2.28621]	0.000797 (0.00806) [ 0.09884]	0.015490 (0.02460) [ 0.62966]
D(LNSADJNO(-1))	0.050100 (0.47850) [ 0.10470]	0.389298 (0.24094) [ 1.61574]	1.037544 (0.73539) [ 1.41088]
R-squared	0.782744	0.249509	0.297368
Adj. R-squared	0.705152	-0.018523	0.046428
Sum sq. resids	0.010963	0.002780	0.025893
S.E. equation	0.019787	0.009963	0.030410
F-statistic	10.08800	0.930892	1.185017
Log likelihood	104.1093	130.8673	87.34933
Akaike AIC	-4.774838	-6.147041	-3.915350
Schwarz SC	-4.305628	-5.677832	-3.446140
Mean dependent	-0.005323	0.012780	-0.005314
S.D. dependent	0.036440	0.009872	0.031141
Determinant resid covariance (dof adj.)		2.17E-11	
Determinant resid covariance		8.01E-12	
Log likelihood		332.2042	
Akaike information criterion		-15.18996	
Schwarz criterion		-13.65436	

## B.2 PreSort Barcoded Small Letter Volumes

### Static Model

The long run static model is:

$$\text{Insadj\_c}(t) = a + b \text{Insadjno}(t) + c \text{Insp200c}(t) + d \text{barcintr}(t) + e(t)$$

Given by the following output:

Dependent Variable: LNSADJ_C				
Method: Least Squares				
Date: 02/08/10 Time: 22:11				
Sample: 1995Q3 2009Q3				
Included observations: 57				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.952251	1.009067	-6.889782	0.0000
LNSADJNO	0.922505	0.072966	12.64301	0.0000
LNSP200C	0.102397	0.024363	4.202902	0.0001
BARCINTR	0.106938	0.025734	4.155438	0.0001
R-squared	0.949582	Mean dependent var		6.047681
Adjusted R-squared	0.946728	S.D. dependent var		0.196826
S.E. of regression	0.045429	Akaike info criterion		-3.277747
Sum squared resid	0.109380	Schwarz criterion		-3.134375
Log likelihood	97.41579	Hannan-Quinn criter.		-3.222028
F-statistic	332.7365	Durbin-Watson stat		1.290670
Prob(F-statistic)	0.000000			



## Dynamic Model

### Vector Error Correction Estimates

Date: 02/18/10 Time: 19:45

Sample (adjusted): 1996Q1 2009Q2

Included observations: 54 after adjustments

Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1		
LNSADJ_C(-1)	1.000000		
LNSADJNO(-1)	-0.756306 (0.17256) [-4.38277]		
LNSP200C(-1)	-0.155590 (0.07012) [-2.21897]		
C	5.519276 (2.34872) [ 2.34990]		
Error Correction:	D(LNSADJ_C)	D(LNSADJNO)	D(LNSP200C)
CointEq1	-0.232753 (0.07348) [-3.16742]	-0.054916 (0.01536) [-3.57565]	-0.033000 (0.18570) [-0.17770]
D(LNSADJ_C(-1))	-0.334743 (0.12240) [-2.73478]	0.036858 (0.02558) [ 1.44078]	0.146719 (0.30933) [ 0.47432]
D(LNSADJNO(-1))	-0.217818 (0.76405) [-0.28508]	-0.105320 (0.15969) [-0.65953]	2.541849 (1.93086) [ 1.31644]
D(LNSP200C(-1))	0.007698 (0.05990) [ 0.12850]	-0.012409 (0.01252) [-0.99112]	0.142988 (0.15139) [ 0.94452]
BARCINTR	0.000695 (0.00881) [ 0.07894]	0.005539 (0.00184) [ 3.00783]	-0.032890 (0.02226) [-1.47723]
R-squared	0.292792	-0.031765	0.124251
Adj. R-squared	0.235061	-0.115991	0.052761
Sum sq. resids	0.092052	0.004021	0.587882
S.E. equation	0.043343	0.009059	0.109534
F-statistic	5.071632	-0.377146	1.738020
Log likelihood	95.48579	180.0180	45.42306
Akaike AIC	-3.351325	-6.482146	-1.497150
Schwarz SC	-3.167160	-6.297981	-1.312985
Mean dependent	0.011429	0.008513	0.001192
S.D. dependent	0.049557	0.008575	0.112543
Determinant resid covariance (dof adj.)		1.44E-09	
Determinant resid covariance		1.08E-09	
Log likelihood		327.5944	

Akaike information criterion	-11.42942
Schwarz criterion	-10.72959

### B.3 Other Large Letter Volumes

#### Static Model

The long run static model is:

$$\text{Insadj\_b}(t) = a + b \text{Insadjno}(t) + c \text{closofth}(t) + d \text{econdown}(t) + e(t)$$

Given by the following output:

Dependent Variable: LNSADJ_B				
Method: Least Squares				
Date: 02/09/10 Time: 10:26				
Sample: 2001Q3 2009Q3				
Included observations: 33				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.088171	1.211509	0.898195	0.3765
LNSADJNO	0.229926	0.097985	2.346553	0.0260
CLOSOFTH	0.085744	0.020395	4.204163	0.0002
ECONDOWN	-0.089463	0.018655	-4.795673	0.0000
R-squared	0.694105	Mean dependent var		4.023351
Adjusted R-squared	0.662461	S.D. dependent var		0.051935
S.E. of regression	0.030173	Akaike info criterion		-4.050498
Sum squared resid	0.026403	Schwarz criterion		-3.869103
Log likelihood	70.83322	Hannan-Quinn criter.		-3.989464
F-statistic	21.93463	Durbin-Watson stat		1.776892
Prob(F-statistic)	0.000000			

## Dynamic Model

### Vector Error Correction Estimates

Date: 02/22/10 Time: 21:58

Sample: 2001Q3 2009Q2

Included observations: 32

Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	
LNSADJ_B(-1)	1.000000	
LNSADJNO(-1)	-0.237200	
	(0.08304)	
	[-2.85660]	
C	-1.067825	
Error Correction:	D(LNSADJ_B)	D(LNSADJNO)
CointEq1	-1.068468	9.51E-06
	(0.23671)	(0.06005)
	[-4.51379]	[ 0.00016]
D(LNSADJ_B(-1))	0.085565	0.037021
	(0.18517)	(0.04697)
	[ 0.46210]	[ 0.78810]
D(LNSADJ_B(-2))	-0.024483	-0.030112
	(0.16265)	(0.04126)
	[-0.15052]	[-0.72977]
D(LNSADJ_B(-3))	-0.295727	0.003758
	(0.13973)	(0.03545)
	[-2.11643]	[ 0.10601]
D(LNSADJNO(-1))	-0.299745	-0.221254
	(0.75018)	(0.19031)
	[-0.39957]	[-1.16259]
D(LNSADJNO(-2))	0.371478	-0.544436
	(0.63946)	(0.16222)
	[ 0.58092]	[-3.35606]
D(LNSADJNO(-3))	0.631650	-0.206191
	(0.67335)	(0.17082)
	[ 0.93807]	[-1.20705]
C	-0.075735	0.022086
	(0.02000)	(0.00507)
	[-3.78627]	[ 4.35247]
CLOSOFTH	0.088533	-0.005476
	(0.01855)	(0.00471)
	[ 4.77237]	[-1.16359]
ECONDOWN	-0.070626	-0.014186
	(0.02081)	(0.00528)
	[-3.39464]	[-2.68777]

R-squared	0.746874	0.522551
Adj. R-squared	0.643322	0.327231
Sum sq. resids	0.015338	0.000987
S.E. equation	0.026404	0.006698
F-statistic	7.212569	2.675355
Log likelihood	76.88457	120.7774
Akaike AIC	-4.180286	-6.923585
Schwarz SC	-3.722243	-6.465542
Mean dependent	0.000173	0.008210
S.D. dependent	0.044211	0.008167
Determinant resid covariance (dof adj.)		3.05E-08
Determinant resid covariance		1.44E-08
Log likelihood		198.0632
Akaike information criterion		-11.00395
Schwarz criterion		-9.996257

## B.4 PreSort Barcoded Large Letter Volumes

### Static Model

The long run static model is:

$$\text{Insadj\_d}(t) = a + b \text{Insadjno}(t) + c \text{Insp200c}(t) + d \text{barcintr}(t) + e(t)$$

Given by the following output:

Dependent Variable: LNSADJ_D				
Method: Least Squares				
Sample: 1995Q3 2009Q3				
Included observations: 57				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-13.38582	2.138342	-6.259904	0.0000
LNSADJNO	1.015373	0.154624	6.566742	0.0000
LNSP200C	0.288014	0.051629	5.578497	0.0000
BARCINTR	0.168807	0.054535	3.095408	0.0031
R-squared	0.892046	Mean dependent var		3.531899
Adjusted R-squared	0.885936	S.D. dependent var		0.285046
S.E. of regression	0.096270	Akaike info criterion		-1.775737
Sum squared resid	0.491195	Schwarz criterion		-1.632365
Log likelihood	54.60850	Hannan-Quinn criter.		-1.720018
F-statistic	145.9840	Durbin-Watson stat		2.097022
Prob(F-statistic)	0.000000			

### Dynamic Model

#### Vector Error Correction Estimates

Date: 02/18/10 Time: 14:47

Sample (adjusted): 1996Q3 2009Q2

Included observations: 52 after adjustments

Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1		
LNSADJ_D(-1)	1.000000		
LNSADJNO(-1)	-0.911821 (0.11941) [-7.63631]		
LNSP200C(-1)	-0.346241 (0.05649) [-6.12897]		
C	12.82946		
Error Correction:	D(LNSADJ_D)	D(LNSADJNO)	D(LNSP200C)
CointEq1	-1.153836 (0.21863) [-5.27752]	0.010099 (0.02208) [ 0.45746]	0.271402 (0.29486) [ 0.92044]
D(LNSADJ_D(-1))	0.086260 (0.18351) [ 0.47004]	-0.005439 (0.01853) [-0.29354]	0.113792 (0.24750) [ 0.45977]
D(LNSADJ_D(-2))	0.302464 (0.16250) [ 1.86136]	7.27E-05 (0.01641) [ 0.00443]	0.004326 (0.21915) [ 0.01974]
D(LNSADJ_D(-3))	0.189038 (0.13179) [ 1.43437]	0.019258 (0.01331) [ 1.44720]	-0.001057 (0.17774) [-0.00594]
D(LNSADJNO(-1))	0.297940 (1.54286) [ 0.19311]	-0.156587 (0.15578) [-1.00516]	1.036576 (2.08080) [ 0.49816]
D(LNSADJNO(-2))	-0.768923 (1.55782) [-0.49359]	-0.428869 (0.15730) [-2.72652]	-1.688513 (2.10098) [-0.80368]
D(LNSADJNO(-3))	-4.041519 (1.64206) [-2.46124]	-0.271419 (0.16580) [-1.63702]	-4.560660 (2.21460) [-2.05936]
D(LNSP200C(-1))	-0.134035 (0.14208) [-0.94335]	0.008858 (0.01435) [ 0.61746]	0.269533 (0.19162) [ 1.40658]
D(LNSP200C(-2))	0.048642 (0.13781) [ 0.35295]	0.024070 (0.01392) [ 1.72973]	0.220616 (0.18587) [ 1.18696]
D(LNSP200C(-3))	-0.184983	-0.008895	0.104459

	(0.12987)	(0.01311)	(0.17515)
	[-1.42436]	[-0.67835]	[ 0.59639]
C	-0.047168	0.019444	0.106277
	(0.05229)	(0.00528)	(0.07052)
	[-0.90201]	[ 3.68266]	[ 1.50695]
BARCINTR	0.122927	-0.005140	-0.081153
	(0.04180)	(0.00422)	(0.05638)
	[ 2.94056]	[-1.21780]	[-1.43941]
R-squared	0.730073	0.332507	0.314653
Adj. R-squared	0.655843	0.148947	0.126183
Sum sq. resids	0.251165	0.002561	0.456845
S.E. equation	0.079241	0.008001	0.106870
F-statistic	9.835307	1.811432	1.669509
Log likelihood	64.87031	184.1021	49.31624
Akaike AIC	-2.033473	-6.619312	-1.435240
Schwarz SC	-1.583186	-6.169025	-0.984953
Mean dependent	0.013252	0.008509	0.000454
S.D. dependent	0.135074	0.008673	0.114326
Determinant resid covariance (dof adj.)		4.12E-09	
Determinant resid covariance		1.88E-09	
Log likelihood		301.0955	
Akaike information criterion		-10.08060	
Schwarz criterion		-8.617163	