



Domestic Other Letter Volume Demand Update
A Public Document Produced on Behalf of Australia Post

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Note

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KEY FINDINGS

Diversified Specifics construct forecast baselines on behalf of Australia Post for each of the key letter volume segments by utilising a set of vector error correction models¹ and then augmenting those forecasts with further intelligence on emerging threats.

The most significant general trend in recent years involves a sustained movement towards bill presentment type substitution that has resulted in a series of annual declines in PreSort Barcoded small letter volumes whilst also accelerating the year on year declines in Other small letter volumes.

Despite strong recipient support still existing for the physical letter the bill presentment declines are being driven by business strategies that aim to reduce transaction costs via the imposition of surcharges on the provision of a paper-based bill/statement and a tendency to not provide the option for a paper-based bill with new services.

As a result fluctuations in macro indicators such as the level of economic activity have diminished in their ability to explain and predict letter volume movements.

Australia Posts' letter segments are now entrenched within a new wave of substitution as the propensity for invoice and statement presentments to migrate across from the traditional letter to an electronic alternative has never been greater.

The source research encompassing this undertaking is focused on efforts that attempt to explain and forecast Other (Ordinary) small and large letter volume fluctuations.

Other Small Letter Volume Forecasts

In 2012/13 Other small letter volumes declined by 10.3%, a figure almost double the annual fall in each of the three preceding years.

Accelerated Other small letter volume declines are projected in the forecast period (See the final column in Table 1) as substitution is now occurring on two fronts, bill payments and presentments.

Bill payments type mailings have traditionally been characterised by a sustained decline over a 15 year period and have explained an average decline in the Other small letter volume segment of 3.3% over the 2000/01 to 2011/12 timeframe.

However, the SME bill presentment component of the Other small letter volume segment is now also under significant threat from online platforms which, with the proliferation of various mobile devices now offers a greater variety of available and effective channels when rendering an invoice.

Recent annual declines combined with internal Australia Post intelligence into changing behavioural patterns within the Other small letter charge account volume data suggest the bill presentments component of this category might approximate around 25% of the segment.

Independent research has estimated a 20% increase in the annual growth of SME electronic invoicing practices in future years and this trend permits the augmentation of any econometric forecasts whilst also explaining the magnitude of recent and forecasted declines in the Other small letter volume segment.²

¹ The vector error correction models nest the structural and cyclical components of letter volume trends into a methodology that allows an examination of short and long run fluctuations of letter volumes and their relevant drivers.

² Billentis (2013), "E-Invoicing E Billing - The catalyst for AR/AP Automation", p.8



Table 1 Other Small Letter Volume Forecasted Growth Rates

	Econometric Forecasts		Econometric Forecasts Augmented with Additional Intelligence
	<i>Incorporating bill payments substitution and no nominal price rises</i>	<i>Incorporating bill payments substitution with a nominal price rise of 16.7% in April 2014</i>	<i>Incorporating bill payments and presentments substitution, a nominal price rise of 16.7% in April 2014 and election related mailings</i>
2013/14	-4.79%	-4.79%	-9.47%
2014/15	-5.88%	-10.16%	-15.41%
2015/16	-6.00%	-5.15%	-11.15%
2016/17	-6.01%	-5.92%	-12.54%

Other Large Letter Volume Forecasts

Other large letter volumes are also expected to be impacted significantly by substitutive pressures although unlike its small letter counterpart, the contents of a typical Other large letter item is very difficult to present a definitive profile of.

As a result substitution effects pertaining to the Other large letter volume segment tend to reflect a general trend towards increasing usage of digital technology within the B2B (SME) and C2B segments of the economy.

Fixed line broadband growth therefore acts as an effective proxy for capturing these substitutive pressures *historically*. The underlying hypothesis suggests that as the number of broadband connections has increased substantially in recent years, electronic documentation such as PDFs and MS Word documents have now become viable alternatives to a physical mail item that previously would have resided in the Other large letter domain.

When constructing letter volume *forecasts* however a fixed line broadband penetration variable adds little utility as anticipated growth rates are now approaching a saturation point. This plateau does not reflect the continued movements away from the traditional Other large letter mail item that have been recently observed and are likely to continue into the forecast period.

Aggressive growth is expected in LTE 4th generation technology (of which Australia is an adopter), tablets and next generation smartphones. Such data is therefore deemed to be more appropriate as a proxy for capturing the next wave of Other large letter substitution given the elasticities generated via the econometric models are a direct function of similar growth rates for fixed-line broadband in its own period of exceptional growth.

Other large letter *ex-ante* baseline forecasts over the 2013/14 to 2016/17 timeframe are presented in Table 2 and emphasise an anticipated continuation in this increasing downward trend.



Table 2 Other Large Letter Volumes Forecasted Growth Rates

	Based on Conservative Substitution Effects	Based on Aggressive Substitution Effects <i>(More realistic scenario)</i>
2013/14	-6.23%	-6.96%
2014/15	-5.97%	-7.14%
2015/16	-5.59%	-7.39%
2016/17	-5.20%	-7.91%

Unlike the Other small letter volume product segment there are no further off-model augmentations to the Other large letter volume forecasts.

For Further Detail Consult the Source Documentation



1. INTRODUCTION



1.1 OVERVIEW

1.1.1 Background

Since the late 1990's Diversified Specifics has developed econometric models on behalf of Australia Post that attempt to explain and forecast future movements in Australia Posts' key letter volume product segments.

The most recent public document in this series on letter volumes at Australia Post suggested the need for any econometric forecasts to be augmented with additional intelligence on the emerging threats to mail wherever empirical data on those threats was scarce.³

This methodology reflects a global trend by researchers in the field of postal and delivery economics when attempting to model letter volume demand in an industry characterized by substantive technological and behavioural change.⁴

In the 1970's, 80's and early 90's this was not always the case as aggregate letter volume forecasts were generally predicted adequately by rather simplistic models premised upon a number of key linear associations.

Originally these letter volume models were essentially driven by a number of key long run drivers that included Real non-farm GDP, population growth, delivery service performance and changes in real the price of a letter.

Of these variables movements in the level of economic activity proved to be the primary driver of aggregated letter volume fluctuations which was unsurprising given a large proportion of mailings tended to be transactional in nature.

Although some logical linkages between movements in the level of economic activity and fluctuations in the transactional letter item still remains the threats presented by electronic substitution, consolidation and rationalisation have substantially crowded out the statistical association with fluctuations in the level of domestic GDP.

The pathway to this lessening has manifested itself in waves and to understand this evolutionary path it's important to acknowledge the underlying mix within the transactional small letter category.

The majority of transactional letters tend to be either bill presentments/statements or bill payments.

Since the mid to late nineties two fundamental changes to the postal landscape have significantly altered Australia Posts' letter volume growth expectations and additionally had an enormous impact upon the framework of Diversified Specifics econometric approach.

³ Diversified Specifics Pty. Ltd (2011), *Econometric Validations & Augmentations*, A report prepared for the Australian Postal Corporation, p.4

⁴ See Fève, Florens, Veruete-McKay, Rodriguez and Soteri (2012), "Uncertainty and Projections of the Demand for Mail", Chapter 6 in "Multi-Modal Competition and the Future of Mail", Edward Elgar Publishing; and Martin, Paterson and Wang (2012), "Forecasting Letter Volumes: Augmenting Econometric Baseline Projections", Chapter 5 in "Multi-Modal Competition and the Future of Mail" Edward Elgar Publishing.



1.1.2 Bill Payments - The first wave of substitution

The first major change has been the gradual substitution away from the traditional mail item in the realm of bill payments which commenced throughout the 1990's and still continues on until this day.

On the bill payments side of a transaction alternative mediums to the traditional letter item began to emerge and garner an increasing degree of popularity for those interested in settling an invoice.

In the late 1990's Australia Post and indeed most international postal authorities tended to base their forecasts on rudimentary econometric models of aggregate, rather than segmented letter volumes.

Such models suggested no evidence for electronic substitution as total letter volumes tended to be characterised by stable year on year positive growth rates.

Electronic substitution was however occurring and Diversified Specifics employed a series of product specific Other and PreSort Barcoded econometric models to emphasise these trends.

At this segmented level, the Other small letter volume model was indeed characterised by substitutive pressures evident by consistent annual volume declines.

Volumes attributable to the traditional modes of bill payments such as cheques and money orders began to give way to online bill payment platforms, phone based transaction settling technologies and the increased popularity of direct debit facilities (See for recent trends).

Table 1.1.2.1 illustrates trends in a number of bill payments modes since the early 2000's when the Reserve Bank of Australia commenced the data collection of cheque volumes.

At an aggregate level these trends would have otherwise gone unnoticed as a result of the significant increases in bill presentment type mailings.

The majority of bill presentments resided within the PreSort Barcoded small letter volume category whose fluctuations remained largely explained by a high correlation with the fluctuations in the level of Australian economic activity.

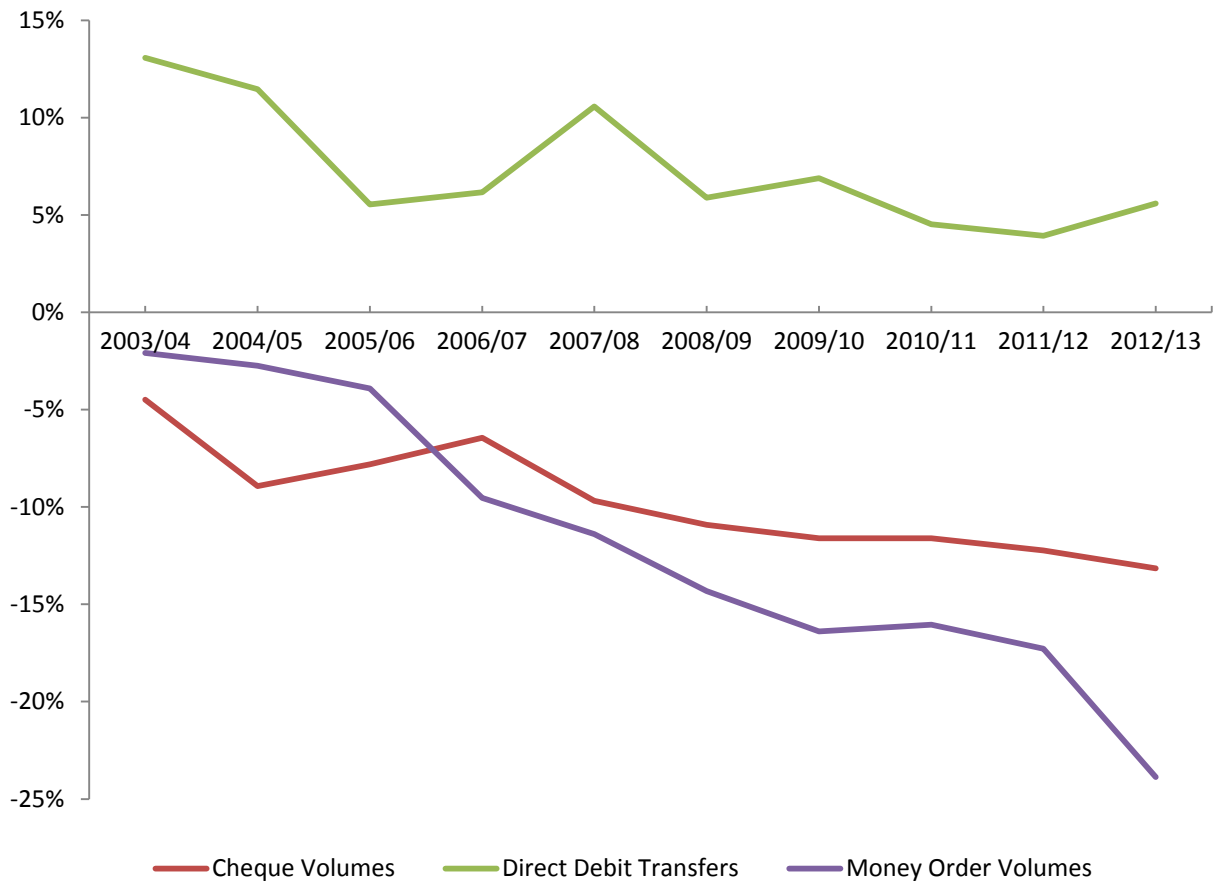
At the same time bill payments related volumes were being eroded by new platforms, bill presentments were on the other hand experiencing above average growth rates as a result of lifestyle changes on behalf of Australian consumers.

These changes were reflected by increases in the number of mobile phones, increasing numbers of Pay T.V subscriptions, an expansion in secondary credit cards and so on. Each of these lifestyle changes tended to be accompanied by an additional invoice and/or statement which more often than not manifested itself in the form of an additional PreSort small letter volume item.

Whilst fluctuations in aggregate total letter volumes therefore began to move independent from the GDP trend line there certainly was no rapid decline to indicate rampant substitution for the entire transactional letter volume segment.



Table 1.1.2.1 Changing bill payments behaviours
Annual rates of growth and decline across differing modes



Source: Reserve Bank of Australia & Australia Post.



1.1.3 Bill Presentments - The second wave of substitution

In late 2008 with the collapse of Lehman Brothers, the largest bankruptcy in the history of the United States and the onset of the global financial crisis all letter volume segments at Australia Post began to register annual declines.

Under such circumstances PreSort Barcoded small letter volume models predicted these declines reasoning that as the level of economic activity slowed then fewer transactions in the economy would result in few bill presentments, all other factors remaining constant.

Certainly there was some truth to this cyclical explanation however this downturn also acted as a catalyst for structural changes to bulk bill and statement mailings suggesting that beyond 2008 the Australian postal industry has broken into a new wave of substitution where bill presentments declines have emanated from an increasing propensity for cost containment strategies on the part of senders.

The situation at Australia Post mirrored those of other postal authorities. Indeed, Diversified Specifics worked in concert with researchers at Itella in Finland to model and research similar circumstances in the Finnish case with remarkably comparable findings.⁵

At the crux of the issue, downside pressures in the form of letter volume consolidation, rationalisation and substitution practices intensified with firms attempting to maintain their profit margins through cost reductions in the face of diminishing sales.

Importantly, this trend did not imply a total consensus between the sender and receiver as relates to the prevailing bill presentment platforms employed.

Indeed Diversified Specifics multi-country cross sectional surveys have indicated the recipients preferences for the physical letter item remains strong yet mail senders motivated by cost reductions have tended to engage in a range of tactics aimed at engendering some form of behavioural shift on the part of the recipient to accept the new substitutive platforms.⁶

This process has taken time to filter through to full scale structural change in the realm of bill presentments however the continual slide in PreSort Barcoded small letter volumes indicate this process is clearly now well underway.

Additionally, Other small letter volumes have also registered increasingly severe declines since 2008 and this can reasonably be attributable to a proportion of this letter volume segment also being comprised of bill presentments at the owner-operator and SME level.

Adding to the complexity of the analysis is Australia Post themselves are actively engaged in attempting to cultivate their own niche within the electronic bill presentments landscape with products such as the Digital MailBox representing its own alternative to the traditional physical letter.

⁵ Paterson C.J. Martin V. L, Nikali H. & Li Q. (2012), "Dynamic Letter Volume Models: How Does an Economic Downturn Affect Substitution Propensities?" in Reforming the Postal Sector in the Face of Electronic Competition, M.A. Crew and P.R. Kleindorfer (eds), Edward Elgar Publishing Ltd.

⁶ See Paterson C.J. Nikali H. & Elkela K. (2013), "Digitalization of Consumer Invoices - A Comparative Study" The Role of Postal Service in a Digital Age, M.A. Crew and T.J. Brennan (eds), Edward Elgar Publishing Ltd (Forthcoming), p.283.



1.1.4 Consequences for modelling and forecasting of letter volumes

The ability to incorporate the vast array of emerging threats to letter volumes directly into the modelling framework can, at times be limited by the availability of few, if any empirical observations.

Nevertheless over time as additional information on emerging threats becomes available this provides increasing clarity on the penetration levels of the various platforms and makes it possible to directly measure the scope, magnitude and direction of technological change.

Where localised information and data is unavailable international case studies may provide valuable insights into the emerging technologies which can be utilised in developing scenarios for Australian volumes.

The adjustment of the econometric forecasts for Other small letter volumes to include a provision for the off-model effects of bill presentment type substitution as an example of this augmentation process is contained within Section 5.2.4 of this document.

Diversified Specifics methodology involves constructing forecast baselines by utilising a set of vector error correction models⁷ (VECMs) and then augmenting those forecasts with further information on emerging threats that may not have the requisite empirical information required to embed them within the formal econometric process.

Future efforts by Australia Post should be aimed at directly monitoring consolidation and rationalisation effects individually for bill presentment type mail.

Similar caveats to previous research and modelling produced by Diversified Specifics in this series of research on the baseline forecasts do apply and any interpretations of the econometric projections presented in this documentation should be treated with all due care with a recognition that further augmentations based upon sound institutional knowledge must continually be cultivated.

⁷The vector error correction models nest the structural and cyclical components of letter volume trends into a methodology that allows an examination of short and long run fluctuations of letter volumes and their relevant drivers.



1.1.5 Scope of the current research undertaking

The source research encompassing this project is focused on efforts that attempt to explain and forecast Other (or Ordinary) small and large letter volume fluctuations.⁸ Diversified Specifics have produced a number of documents in this series since the year 2000 and the VECMs presented within this report are intended as a logical extension or update of previous incarnations.

In the May 2010 statement of reasons, in reference to the econometric baseline derived by Diversified Specifics the ACCC concluded:⁹

Australia Post has significantly improved the sophistication of its demand forecasting methods. The ACCC considers that the volume forecasts are appropriate for its assessment of the 2010 price notification.

Moreover, Frontier Economics in their assessment of the techniques employed resolved:¹⁰

Diversified Specifics' econometric analysis was in line with internationally accepted leading practices in mail volume forecasting.

And, that:¹¹

Australia Post has adopted a more sophisticated approach to forecasting mail demand [and] Diversified Specifics has derived baseline econometric forecasts based on best practice time series technique for mail volume forecasting.

Diversified Specifics econometric forecasts were intended to represent a baseline over which further intelligence could be overlaid on the emerging threats to letter volumes.

As a result, Australia Post engaged in an augmentation of Diversified Specifics forecasts based upon management opinion and market intelligence.

In this research undertaking Diversified Specifics has developed a set of letter volume forecasts that encompass both the econometric and augmented components.

As distinct from the 2010 price notification the broadening of Diversified Specifics scope in this manner has resulted in a set of final forecasts that are premised upon:

- Historical associations governing letter volume fluctuations – Reflected in the econometric baseline; &
- Emerging threats to letter volumes - Based upon research into recent behavioural and technological patterns.

⁸ The 'Other' (or Ordinary) small letter segment discussed in this document consists of full rate business mail, cheque payments and other consumer correspondence that satisfy the relevant small letter category size and weight requirements; the dominant products categories are Ordinary Letters and Clean Mail. The 'Other' (or Ordinary) 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.

⁹ Australian Competition and Consumer Commission, Australian Postal Corporation 2010 Price Notification Decision Public version, May 2010, p.45

¹⁰ Frontier Economics, Review of Australia Post's volume and input cost forecasts, report prepared for the ACCC, November 2009, p. 19

¹¹ Frontier Economics, Review of Australia Post's volume and input cost forecasts – a report prepared for the ACCC, May 2010, p. iii.



2. RECENT TRENDS



2.1 SEGMENTED LETTER VOLUME GROWTH

Table 2.1.1 illustrates the downward trend in each of the Other (Ordinary) letter volume product segments over the past twelve months which is especially severe when contrasted to the average annual growth rates since 2000/01.

Despite the recent strength in the domestic economy it appears that both of the Other letter volume segments are now being impacted by an increased degree of downside pressure emanating from the combined threats of substitution, rationalisation and consolidation.

Specifically, the proportion of SME and owner operator bill presentments contained within Other small letter volumes are likely to explain a tendency for declines in this letter volume segment to be greater than its historical average.

**Table 2.1.1 Growth Rates at a Glance
Other Letter Segments & Volume Drivers**

	Rolling 12 Month Growth Rate (2011/12-2012/2013)	Average Annual Growth Rate (2000/01-2011/12)
Other Small Letters & Key Drivers		
Other Small Letter Volumes	-10.3%	-3.3%
Cheque Volumes	-13.2%	-9.3%*
Real Price of Other Small Letters	-2.3%	-0.1%
Other Large Letters & Key Drivers		
Other Large Letter Volumes	-6.5%	-1.8%
Domestic Broadband Index (Fixed)	7.7%	40.4%*
Asia Pacific Broadband Index (Mobile)	112.8%^	N/A
Non-Farm Real GDP	3.1%	3.2%

* The average annual growth rate for these variables are calculated from 2002/03 due to data availabilities.

^2012 growth rate for the Asia Pacific region as given by Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011–2016, p.24

NB: Due to limitations regarding data availabilities at the time of modelling the following proxies have been utilised when constructing the ex-ante forecasts: 1) Rolling 12 month growth rates for the period of September 2011 to September 2012 for cheque volumes (-13.07%) and fixed-line broadband (10.89%).

To provide some context to the downward trend in the Other small letter volume segment it is useful to consider similar tendencies in the PreSort Barcoded small letter volume segment that provides overwhelming evidence of the changing small letter landscape at Australia Post.¹²

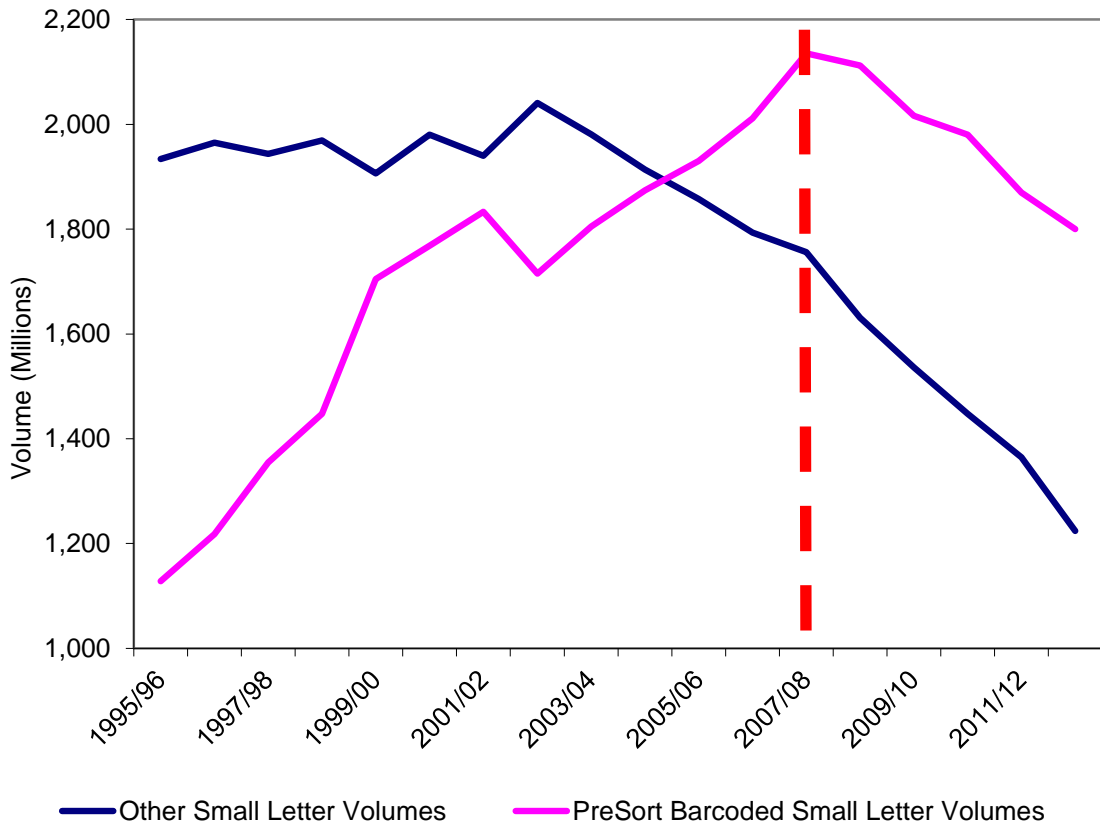
¹² The 'PreSort Barcoded small letter' segment consists of bulk (300+) lodgements of 1) Business transactional letter volumes such as bills, statements, share notices and letters advising customers of price increases, policy changes, etc; & 2) Direct mail including promotional letters, brochures and other addressed promotional material that satisfies the relevant small letter category size and weight requirements; the dominant product category is business transactional PreSort Letters. This product segment is considered out of scope for this research undertaking.



Over the course of the past few years cyclical explanations of volume declines have given way to a structural change explanation for the fall in PreSort Barcoded small letter volumes and also the accelerated decline in Other small letter volumes as evidenced in Chart 2.1.1.

Chart 2.1.1 Small Letter Volumes – Other vs PreSort Barcoded

Dashed red line indicates the onset of the Global Financial Crisis



These structural change effects have evolved because businesses are now driven by a number of factors including:

- The lowest possible total transaction cost which has facilitated substitution away from the traditional mail item;
- Improvements to billing cycle times by rationalising the amount of bills sent according to a regular cycle; and
- Embracing the potential benefits from integrating transactional communications with their CRM systems by consolidating transactional and promotional mailings.

It is anticipated that the post 2008/09 declines in PreSort Barcoded small letter volumes are largely due to a combination of these cyclical and structural change effects, with the impact of the former pre-dating that of the latter.

The decoupling of gross domestic product (GDP) and bill payments type volumes (largely defining the Other small letter volume segment) had occurred throughout the 1990's.

However, Table 2.1.3 illustrates that a similar separation in recent times for bill presentment type



volumes (largely defining the PreSort small letter volume segment).

Indeed, the increasing speed of the Other small letter volume decline since 2008/09 also suggests some exposure to additional:

- Income effects as economic conditions dipped below their long run averages and the quantity of transactions within the economy and hence the number of bills to be settled, declined; and
- Structural change effects associated with a percentage of SME bill presentment type mailings that exist within the Other small letter volume category that are being impacted in a similar way to the bulk presentments of the PreSort small letter volume segment.

In the most recent financial year these structural change explanations for both PreSort and Other small letter volume segments have become increasingly problematic with an increase in the level of economic activity failing to produce a rebound in either category.

Table 2.1.3 Small Letter Volume Segment Growth vs GDP Growth

	Small Letters		Australian Non-farm GDP
	Other	PreSort Barcoded	
2003/04	-2.93%	5.23%	3.73%
2004/05	-3.41%	3.82%	3.17%
2005/06	-2.93%	3.02%	3.05%
2006/07	-3.45%	4.21%	4.24%
2007/08	-2.08%	6.15%	3.71%
2008/09	-7.12%	-1.07%	1.33%
2009/10	-5.81%	-4.57%	2.18%
2010/11	-5.74%	-1.78%	2.33%
2011/12	-5.76%	-5.58%	3.35%
2012/13	-10.30%	-3.72%	3.06%

Similar accelerated downwards movements post 2008/09 are mirrored in the Other and PreSort Barcoded large letter volume segment (See Chart 2.1.2).¹³

¹³ 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. This product segment is considered out of scope for this research undertaking.



Chart 2.1.2 Large Letter Volumes – Other vs PreSort Barcoded
Dashed red line indicates the onset of the Global Financial Crisis



2.2 SEASONALITY

The quarterly seasonal factors for each of the Other letter volume segments over the July 1995 to December 2012 timeframe are summarised in Table 2.2.1.

To give each of these figures practical interpretation, the quarterly seasonal factors can be contrasted to the quarterly average of 100%. For example, Other small letter volumes in the December quarter are typically 13.83% higher than the quarterly average volume.

Table 2.2.1 Quarterly Seasonal Factors

	Other Small Letters	Other Large Letters
March	90.49%	91.21%
June	95.09%	97.84%
September	100.59%	104.70%
December	113.83%	106.25%

Table 2.2.2 presents the monthly seasonal factors and emphasises the Christmas peak where Other small letter volumes tend to be 31.86% higher than the typical month due to a proliferation in these type of mailings.

As there are distinct seasonal patterns with respect to the mail flow during the course of any given year the letter volume series utilised within this research undertaking are deseasonalised in the modelling process in order to provide a clear insight into the relevant statistical associations.

Table 2.2.2 Monthly Seasonal Factors

	Other Small Letters	Other Large Letters
January	83.73%	79.44%
February	90.60%	93.86%
March	97.18%	100.33%
April	89.21%	90.15%
May	98.78%	103.27%
June	97.22%	100.12%
July	103.32%	104.32%
August	100.67%	104.54%
September	97.74%	105.19%
October	101.23%	107.90%
November	108.46%	106.81%
December	131.86%	104.07%



2.3 DATA TRENDS IN THE OTHER LETTER VOLUME SEGMENTS

Presented in Table 2.3.1 are the annual percentage growth rates since 2000/01 for each of the Other small letter volume hypothesised drivers.

Substitutive forces are clearly evident from this data as traditional modes of bill payments such as cheque volumes and money orders have been in constant decline over the examinable time frame. Additionally, direct debit transfers have also climbed over the same period reflecting an increasing propensity on behalf of the bill recipients to settle any outstanding transactions via alternative non-mail based platforms.

Since 2008/09 Other small letter volumes declines have been substantially more severe than the preceding years supporting the belief that the SME bills and statements component of this letter volume category has become increasingly prone to bill presentment type substitution effects.

Table 2.3.1 Other Small Hypothesised Driver Growth Rates

Variables Utilised in the Other Small Letter Volume Study*	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Other Small Letter Volumes	3.89%	-2.03%	5.19%	-2.93%	-3.41%	-2.93%	-3.45%	-2.08%	-7.12%	-5.81%	-5.74%	-5.76%	-10.30%
Credit Card Volumes	3.44%	7.39%	2.25%	7.14%	6.54%	8.09%	4.39%	3.60%	2.42%	1.97%	1.71%	1.08%	2.23%
Cheque Volumes	N/A	N/A	N/A	-4.49%	-8.93%	-7.81%	-6.45%	-9.69%	-10.92%	-11.61%	-11.61%	-12.23%	-13.15%
Direct Entry Payments for Debit Transfers	N/A	N/A	N/A	13.07%	11.46%	5.54%	6.16%	10.57%	5.88%	6.89%	4.52%	3.93%	5.58%
Money Order Volumes	-3.21%	-1.62%	-5.09%	-2.09%	-2.75%	-3.91%	-9.53%	-11.39%	-14.32%	-16.39%	-16.05%	-17.28%	-23.88%
Australian Non-farm GDP	1.85%	3.95%	3.79%	3.73%	3.17%	3.05%	4.24%	3.71%	1.33%	2.18%	2.33%	3.35%	3.06%
Small Letter Delivery Performance	1.06%	2.53%	0.10%	-1.33%	-1.98%	1.70%	0.94%	-0.72%	-0.42%	0.21%	0.63%	-0.10%	-1.24%
Real Price of Other Small Letters	-15.19%	-2.74%	8.28%	-2.48%	-2.42%	-3.84%	-2.05%	-4.26%	8.46%	-2.74%	5.04%	-1.20%	-2.33%
Estimated Australian Population	1.29%	1.14%	1.16%	1.08%	1.22%	1.36%	1.84%	2.02%	2.08%	1.57%	1.40%	1.66%	N/A

* 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.



Presented in Table 2.3.2 are the annual percentage growth rates since the year 2000/01 for each of the hypothesised Other Large Letter volume drivers. Importantly, even though letter volume declines in this category suggest an increased threat from electronic substitution the key proxy for quantifying this effect since 2002/03 is fixed-line broadband growth which is now plateauing. Therefore, the forecasts derived in Section 5.3.3 for this variable utilise projections on the growth in mobile broadband traffic and alike as a more accurate forward reflection of these substitutive threats.

Table 2.3.2 Other Large Hypothesised Driver Growth Rates

Variables Utilised in the Other Large Letter Volume Study*	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Other Large Letter Volumes	-9.36%	-4.94%	9.38%	0.56%	1.88%	-0.05%	2.76%	-1.74%	-3.68%	-10.85%	-6.53%	-4.89%	-6.48%
Australian Non-farm GDP	1.85%	3.95%	3.79%	3.73%	3.17%	3.05%	4.24%	3.71%	1.33%	2.18%	2.33%	3.35%	3.06%
Domestic Fixed-line Broadband Index	N/A	N/A	100.23%	98.43%	98.35%	63.63%	30.60%	22.60%	29.54%	18.89%	18.58%	12.18%	7.67%
Information Media and Telecommunications Industry	3.56%	2.78%	6.21%	4.51%	2.45%	4.12%	6.22%	6.23%	1.14%	1.46%	3.21%	-0.59%	-2.27%
Finance and Insurance Services Industry	2.38%	7.43%	2.17%	9.83%	8.46%	5.78%	12.05%	7.89%	-0.70%	-0.02%	4.05%	2.62%	5.55%
Public Administration and Safety Industry	2.21%	4.05%	-0.77%	1.62%	3.28%	2.34%	4.63%	0.53%	5.57%	-0.11%	2.59%	5.02%	1.43%
Rental, Hiring & Real Estate Services Industry	-1.75%	2.45%	9.71%	1.14%	0.33%	4.72%	-5.23%	-3.30%	6.14%	1.97%	0.40%	3.28%	3.16%
Retail Trade Industry	2.81%	6.60%	4.60%	5.25%	5.80%	1.42%	5.33%	4.77%	0.12%	1.80%	1.23%	2.64%	2.48%
Wholesale Trade Industry	-0.64%	2.63%	4.72%	4.69%	3.76%	3.33%	2.13%	2.98%	1.67%	3.40%	-0.55%	6.59%	4.59%
Health Care and Social Assistance Industry	4.55%	5.41%	4.34%	4.21%	3.94%	5.00%	4.12%	4.99%	5.57%	5.64%	2.54%	6.60%	6.26%
Education & Training Industry	1.80%	1.89%	1.80%	1.38%	1.36%	1.52%	1.77%	2.09%	3.13%	2.50%	1.01%	1.29%	2.25%
Large Letter Delivery Performance	5.69%	1.51%	1.38%	-3.14%	-2.70%	2.22%	3.15%	1.68%	-2.90%	1.60%	-0.52%	0.74%	-1.05%
Real Price of Other Large Letters	2.60%	-2.74%	-2.54%	-2.48%	-2.42%	-3.84%	-2.05%	-4.26%	10.67%	-2.74%	5.04%	-1.20%	-2.33%
Estimated Australian Population	1.29%	1.14%	1.16%	1.08%	1.22%	1.36%	1.84%	2.02%	2.08%	1.57%	1.40%	1.66%	N/A

* 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. 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.



3. ECONOMETRIC MODELS



3.1 OTHER SMALL LETTERS

3.1.1 Overview

The Other small letter volume model explains 98.0% of the total quarterly variation in Other small letter volumes over the December 2002 to December 2012 timeframe.¹⁴

3.1.2 Long Run Market-based Volume Drivers & Elasticity Estimates

Presented below are the historical demand drivers together with the relevant demand elasticity (where applicable).

- **Cheque Volumes:**

As cheque volumes are positively associated with Other small letter volumes, reductions in cheque volumes suggest a movement away from bill payments utilising the traditional mail item and soften Other Small Letter volumes.

Elasticity¹⁵: A 1% increase in cheque volumes was associated with a 0.51% increase in Other small letter volumes on average in the long-run.

Predictor Variable Recent Trend: Recent cheque volumes have decreased at an annual average rate of 9.3% from 2002/03 to 2011/12 and by 13.2% over the 2012/13 financial year.

- **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 demand responses in the contrary direction.

Elasticity: A 1% increase in the real price of sending Other small letters was associated with a 0.24% decrease in Other Small Letter volumes on average in the long-run.

Predictor Variable Recent Trend: Real price has decreased at an annual average rate of 0.10% from 2000/01 to 2011/12 and fallen by 2.3% over the 2012/13 financial year.

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

¹⁴ Based upon Adjusted R-squared calculations:

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

¹⁵ 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.



3.2 OTHER LARGE LETTERS

3.2.1 Overview

The Other large letter model explains 90.1% of the total quarterly variation in Other large letter volumes over the March 2008 to December 2012 timeframe.

3.2.2 Long Run Market-based Volume Drivers & Elasticity Estimates

Presented below are the historical demand drivers together with the relevant demand elasticity.¹⁶

- **Domestic Broadband:**

Other large letter volumes are hypothesised to predominantly consist of business-to-business SME and consumer to business mailings.

As the number of broadband connections and EDI technology has increased substantially in recent years, electronic documentation such as PDF file formats have become viable alternatives to the sending of communications through regular business mail channels.

As such, variations in letter volumes are explained to a statistically significant degree via the inverse association that Other large letter volumes have with the levels of growth in the broadband Index.

Elasticity: A 1% increase in the Domestic Broadband Index was associated with a 0.49% decrease in Other large letter volumes on average in the long-run.

Predictor Variable Recent Trend: Recent fixed line broadband connections has been growing at an annual average rate of 40.4% between 2002/03 and 2011/12, this figure has slowed to 7.7% growth over the course of the 2012/13 financial year.

On the other hand, mobile broadband connections in the Asia Pacific have grown by 112.8% over the 2012/13 financial year and may therefore provide a superior reflection to the fixed line equivalents when projecting anticipated movements towards substitutive platforms.

- **Real GDP (Non-farm):**

Growth in Real GDP (Non-farm) was statistically significantly associated with growth in Other large letter volumes over the examined time frame.

Elasticity: A 1% increase in Real GDP (Non-farm) was associated with a 1.15% increase in Other large letter volumes on average in the long-run.

Predictor Variable Recent Trend: Real GDP (Non-farm) has been growing at an annual average rate of 3.2% from 2000/01 to 2011/12 and by 3.1% over the 2012/13 financial year.

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

¹⁶ A dichotomous variable denoted ECONDOWN was employed within the error correction component of the VECM which took on a value of 1 from the December quarter of 2008 and zero elsewhere however such a variable was statistically insignificant within the long run component of the model.



3.3 STRUCTURAL BREAKS

3.3.1 Overview

As Section 1.1 of this research document suggests the landscape surrounding letter volumes has altered considerably over the course of the last twenty years.

Letter volume demand drivers that are characterised by statistical significance within an aggregate long run econometric framework tend to be crowded out by the mega trends in technology and the emerging threats that are presently being witnessed.

This is not to say these long run drivers of letter volumes have no potential impact on future letter volume fluctuations.

For example if Australia Post was plagued with substantial industrial action that resulted in delivery service performance standards falling considerably then certainly letter volume demand would decline as a consequence.

Yet in the case of many of these long run drivers the tractable data to be employed is not characterised by large variability and therefore statistical significance diminishes within an econometric model despite the known economic significance.

Diversified Specifics have therefore aimed at developing econometric models that are relevant to an environment that is enormously impacted by the very real threats presented by substitutive technologies.

Under this framework some drivers that do exhibit economic significance are omitted from the models due to the testing procedures that stress the inclusion of a parsimonious number of variables and those exhibiting statistical significance.

In all cases common sense tests should represent the initial determinant of those variables likely to induce movements in letter volumes over the forecast period.

A corollary of the dynamic postal landscape is the question about an appropriate commencement date for the timeframe over which each model is developed.

To determine commencement dates Diversified Specifics have utilised a number of structural break tests to yield a reasonable range over which the timeframe should capture recent letter volume movements and be best placed for forecasting efficacy.

It should be noted that any truncation of a longer timeframe is a careful balancing act as it by definition results in fewer observations than when the entire data series is employed and therefore questions about the adequacy of sample sizes might then be raised.

Diversified Specifics in these modelling efforts has attempted to select timeframes for each of the models that capture the current state of play as regards letter volume trends and drivers despite such obvious restrictions.

The tests for structural breaks utilised in this Section are based upon the techniques presented in the publication:

Martin, Hurn and Harris, Econometric Modelling with Time Series: Specification, Estimation and Testing (2013), Cambridge University Press, New York



3.3.2 Unit Root Tests for Other Small Letters

In this Section, recent tests for unit roots are applied to the Other small letter volume series utilising optimal filtering techniques as well as lag structures based on a modified Akaike information criterion.¹⁷

To allow for structural breaks in the series unit root tests based on known and unknown structural breaks tests are also presented within the following sub-sections.

Without a Structural Break

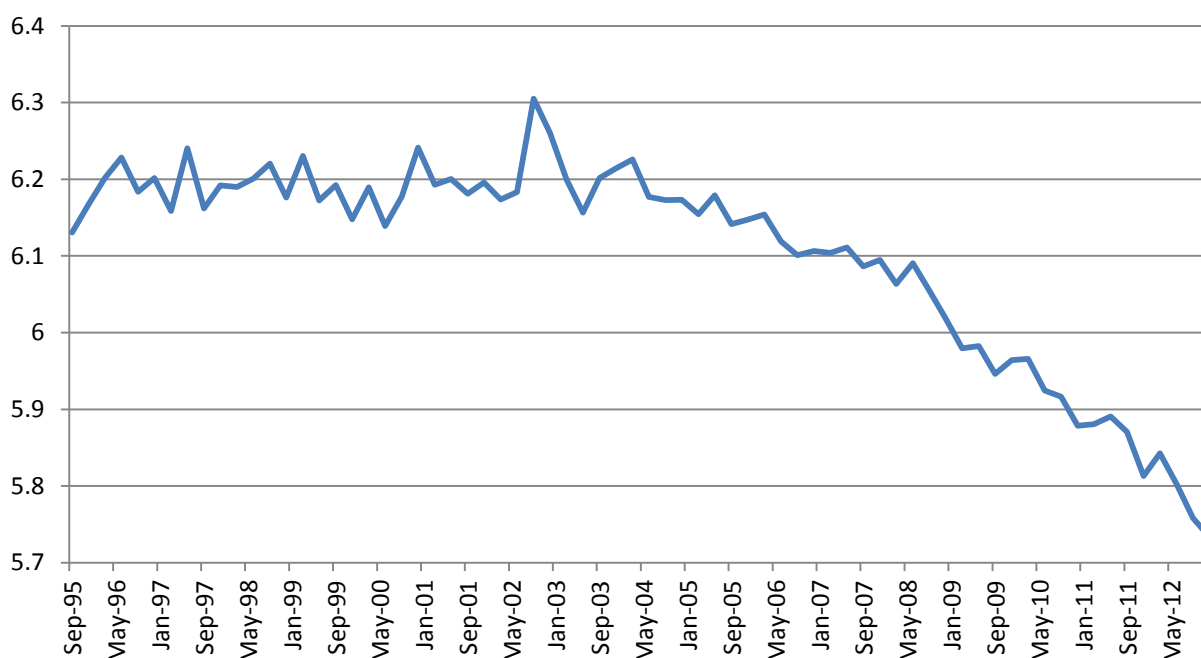
The entire sample timeframe covers the 1995 Q3 to 2012 Q4 periods. This equates to a sample size of $T = 70$ observations.

All unit root tests conducted are based upon the inclusion of a constant and a time trend.

The plot in Chart 3.5.2.1 emphasises a change in trend in around the start of 2002, where before that time the seasonally adjusted natural log of Other small letter volumes tended to hover around 6.2. Beyond 2002 however there is a general downward trend in volumes.

Chart 3.5.2.1 Other Small Letter Volumes

Seasonally Adjusted Natural Logarithmic Transformation



Before performing unit roots tests with an allowance for structural breaks, as a point of comparison preliminary unit root tests that exclude a structural break are initially given in Table 3.5.2.1.

For all tests performed the null hypothesis corresponds to the series exhibiting a unit root (non-stationary) whereas the alternative suggests no unit root is present (stationary).

¹⁷ For detail see Martin, Hurn and Harris (2013), *Econometric Modelling with Time Series: Specification, Estimation and Testing*, Cambridge University Press, New York



Both traditional Dickey-Fuller unit root tests as given by DF_t and more recent unit root tests based on the M class of tests proposed by Stock (1999) and Perron and Ng (1996) as given by the MZ_t statistic.¹⁸

The DF_t and MZ_t statistics are presented based on OLS and GLS filtering methods where the latter has the property of yielding test statistics exhibiting higher power, a total of 4 unit root tests.

Table 3.5.2.1 Unit Root Tests (No Structural Break)

Other Small Letter Volumes

Test	Value	CV(5%,T=50)	CV(5%,T=100)
DF_t (OLS)	-0.103	-3.601	-3.500
MZ_t (OLS)	-0.548	-2.710	-2.921
DF_t (GLS)	-0.271	-3.219	-3.035
MZ_t (GLS)	-0.754	-3.219	-3.035

These results suggest that the null of a unit root cannot be rejected at the 5% level as the value of all test statistics exceed their corresponding critical values.

With a Known Structural Break

To allow for the effects of the change in the Other small letter volume trend identified from an inspection of Chart 3.5.2.1, structural break tests are presented based on a known break point which is taken to occur in 2002 Q3 when the downward trend in this series commenced.

This choice of break point is dictated by the point in time whereby significant trend changes were recognised to occur (See Chart 2.1.1).

As 2002 Q3 corresponds to observation $T_B = 29$ when the structural break occurs, the "fraction" parameter that identifies the timing of the structural break used in the test as well as in the choice of the pertinent critical value, is given by:

$$\lambda = ((29)/(70)) = 0.414$$

In computing the unit root test with a known structural break, this value of the fraction parameter corresponds to a value of $c = -18.4$ which is used in the GLS de-trending version of the unit root test.

The results of the unit root test with a known structural break are provided in Table 3.5.2.2 for just the MZ_t unit root, where, as before, with the results based on both OLS and GLS detrending.

Each of the critical values presented in this table differ to the corresponding critical values given in Table 3.5.2.1 for the case of a unit root test without a structural break as the asymptotic distribution of the unit root statistic in Table 3.5.2.2 is a function of the break point parameter λ .

¹⁸ Stock, J.H. 1999. A class of tests for integration and cointegration. In: Engle, R.F., and White, H. (eds), Cointegration, Causality, and Forecasting: Festschrift in Honour of Clive W. J. Granger. Oxford: Oxford University Press. Perron, P., and Ng, S. 1996. Useful modifications to some unit root tests with dependent errors and their local asymptotic properties. Review of Economic Studies, 63, 435–463.



Table 3.5.2.2 Unit Root Tests (Known Structural Break)

Other Small Letter Volumes

Test	Value	CV
MZ _t (OLS)	-0.541	-3.60
MZ _t (GLS)	-0.971	-3.45

These results suggest that the null of a unit root cannot be rejected at the 5% level assuming a known break point.

Repeating the unit root tests for alternative known structural breaks around 2002 Q3 generate similar qualitative results, namely evidence of Other small letter volumes still representing a nonstationary series.

With an Unknown Structural Break

As an alternative to performing the unit root tests where the timing of the (known) structural break varies over time, unit roots tests are now performed where the timing of the break point is treated as an unknown parameter. The results of the test identify that the break point is located at observation $T_B = 40$ which corresponds to 2005 Q2.

The results of the unit root tests based on an unknown structural break are presented in Table 3.5.2.3 in the case of the MZ_t test using both OLS and GLS filtering methods.

Table 3.5.2.3 Unit Root Tests (Unknown Structural Break)

Other Small Letter Volumes

Test	Value	CV
MZ _t (OLS)	-2.492	-3.60
MZ _t (GLS)	-1.675	-3.45

As with the previous unit root tests, without a structural break and with a known structural break, these results suggest that the null of a unit root cannot be rejected at the 5% level assuming an unknown break point.

The selected break point of $T_B = 40$ given by the test procedure represents a later start date to the start dates used in the known structural break test of $T_B = 29$.

To investigate the effects of these differences in the timing of the structural break on the estimated VECM, this model was re-estimated for a range of sample dates that encapsulated these two potential starting dates.

As the estimates of the VECM were qualitatively very similar, the strategy adopted was to base the VECM on the longer sample size beginning at observation $T_B = 29$ in order to maximize the data length used to identify cointegration and the dynamics through the VECM.



3.3.3 Unit Root Tests for Other Large Letters

In a similar manner to that specified in the previous sub-section, the Other large letter volume series was subjected to recent tests for unit roots utilising optimal filtering techniques in addition to lag structures based on a modified Akaike information criterion.

To allow for structural breaks in the series unit root tests based on known and unknown structural breaks tests are also presented within the following sub-sections.

Without a Structural Break

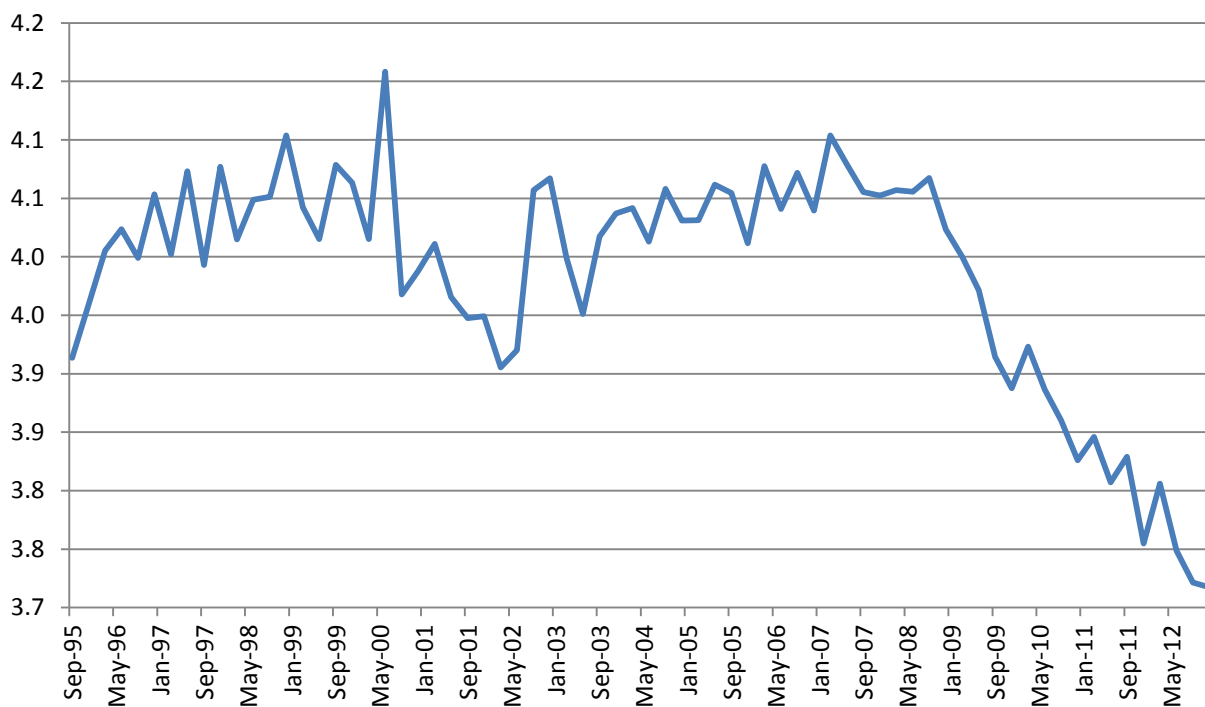
The entire timeframe extends from 1995 Q3 to 2012 Q4, a sample size of $T = 70$ observations.

All unit root tests are based on a constant and a time trend.

The plot below illustrates a change in trend approximately towards the start of 2008.

Chart 3.5.3.1 Other Large Letter Volumes

Seasonally Adjusted Natural Logarithmic Transformation



The unit root tests without allowing for a structural break are provided in Table 3.5.3.1:

Table 3.5.3.1 Unit Root Tests (No Structural Break)

Other Large Letter Volumes

Test	Value	CV(5%,T=50)	CV(5%,T=100)
DF_t (OLS)	-0.882	-3.601	-3.500
MZ_t (OLS)	-0.671	-2.710	-2.921
DF_t (GLS)	-0.507	-3.219	-3.035
MZ_t (GLS)	-0.531	-3.219	-3.035



These results suggest that the null of a unit root cannot be rejected at the 5% level.

With a Known Structural Break

Given that Other large letter volumes started to trend downwards in 2008, the timing of the structural break is taken to occur at observation $T_B = 50$ which corresponds to 2007 Q4.

The "fraction" parameter used in the test is:

$$\lambda = ((50)/(70)) = 0.714$$

For the GLS de-trending version of the unit root test $c = -17.5$.

The results of the test are presented in Table 3.5.3.2:

Table 3.5.3.2 Unit Root Tests (Known Structural Break)

Other Large Letter Volumes		
Test	Value	CV
MZ_t (OLS)	-1.866	-3.58
MZ_t (GLS)	-1.564	-3.37

These results illustrate the null of a unit root cannot be rejected at the 5% level assuming a known break point.

With an Unknown Structural Break

When conducting this test the results suggest the break point is located at observation 2007 Q4.

The results of the unit root tests are presented in Table 3.5.3.3:

Table 3.5.3.3 Unit Root Tests (Unknown Structural Break)

Other Large Letter Volumes		
Test	Value	CV
MZ_t (OLS)	-2.151	-3.60
MZ_t (GLS)	-1.803	-3.45

These results suggest the null of a unit root cannot be rejected at the 5% level assuming an unknown break point.

The selected break point of the unit root test based on an unknown time of the structural break is identified as $T_B = 52$. This choice of a break point is very close to the observation $T_B = 50$ used in the structural break test based on a known structural break in the previous section.

From a structural break perspective this test validates the decision to estimate the VECM based on $T_B = 52$ rather than utilise a slightly longer timeframe and include a dichotomous variable to capture the break. This decision was made in spite of the relatively small sample size in order to retain a certain degree of parsimony within the framework of the model.



4. DRIVER PROJECTIONS



4.1 VARIABLE PROJECTIONS

4.1.1 Preamble

The *ex-ante* forecasts generated in Section 5 of this document are based upon reasonable projections on the drivers where available.

Given the *ex-ante* letter volume forecasts presented in Section 5 are a direct function of values on each of the key drivers it becomes important to assess the degree of variability in the projections on the drivers utilised.

It is this volatility in the forward projections on the drivers that can impact upon the *ex-ante* forecasts and therefore Diversified Specifics have attempted to source projections on a number of key drivers from a selection of recognised institutions.

Importantly volatility need not only be assessed across the various forecasting bodies but also in terms of how each projection has altered over time.

This becomes especially important when conducting sensitivity analysis into specific events such as the global financial crisis where projections on macroeconomic variables can tend to fluctuate rapidly.

A range of driver projections are therefore presented in this section to assist in making an informed selection of the projected values to employ when developing the *ex-ante* forecasts presented in Section 5 of this documentation.



4.1.2 Key Macro Level Projections

In cases whereby reliable projections on the drivers are unavailable observable annual growth rates are utilised as the basis for segmented letter volume forecasting activities.

A summary of the projections for the two key macroeconomic drivers employed within the forecasting process and their associated source are provided in Tables 4.1.1 and 4.1.2.

Table 4.1.1 Real Price of Other Small Letters Projection Table¹⁹

Projection Name	13/14	14/15	2013	2014
The Commonwealth Bank (CPI) ²⁰	2.40%	2.90%	2.10%	2.60%
Commonwealth Budget (CPI) ²¹	2.25%	2.25%		

Table 4.1.2 Australian Non Farm GDP Projection Table

Projection Name	13/14	14/15	15/16	2013	2014	2015
The RBA Upper Limit Projections (GDP) as at May 13 ²²	3.00%	3.25%		2.75%	3.25%	
The RBA Lower Limit Projections (GDP) as at May 13 ²³	2.00%	2.50%		2.75%	2.25%	
Commonwealth Budget (GDP) as at May 13 ²⁴	2.75%	3.00%	3.00%			
ANZ Australia Economics(GDP) as at Jun 13 ²⁵				2.70%	3.30%	2.70%
National Australia Bank (NAB) (GDP) as at Feb 13 ²⁶				2.00%	3.10%	3.10%
The Commonwealth Bank (GDP) as at Jul 13 ²⁷	3.10%	2.60%		2.80%	2.90%	
International Monetary Fund (GDP) as at Apr 13 ²⁸				2.96%	3.31%	3.05%

¹⁹ Projections contained within Table 4.1.1 reflect inflationary estimates that are utilised to represent real price declines in letter volumes absent of any nominal price changes.

²⁰ The Commonwealth Bank of Australia Economic Perspective, p.18, 05 July 2013

²¹ Commonwealth 2013/14 Budget - 14 May 2013 p.45

²² The Reserve Bank of Australia, Statement on Monetary Policy – 9 May 2013 p.62

²³ The Reserve Bank of Australia, Statement on Monetary Policy – 9 May 2013 p.62

²⁴ Commonwealth 2013/14 Budget - 14 May 2013 p.45

²⁵ ANZ Australia Economics Weekly and Monthly Chartbook, 28 June 2013, p.3

²⁶ National Australia Bank Australian Markets Weekly, p.7, 25 February 2013

²⁷ The Commonwealth Bank of Australia Economic Perspective, p.18, 05 July 2013

²⁸ World Economic Outlook (WEO), April 2013, International Monetary Fund



4.1.3 Incorporating Emerging Trends into the Other Large Letter Baseline

In 2011, the ACCC suggested:²⁹

Diversified Specifics should investigate whether there are any other suitable new technology explanatory variables such as the number of internet connections that could be incorporated into future econometric modelling to reflect the impact of the internet on letter volumes.

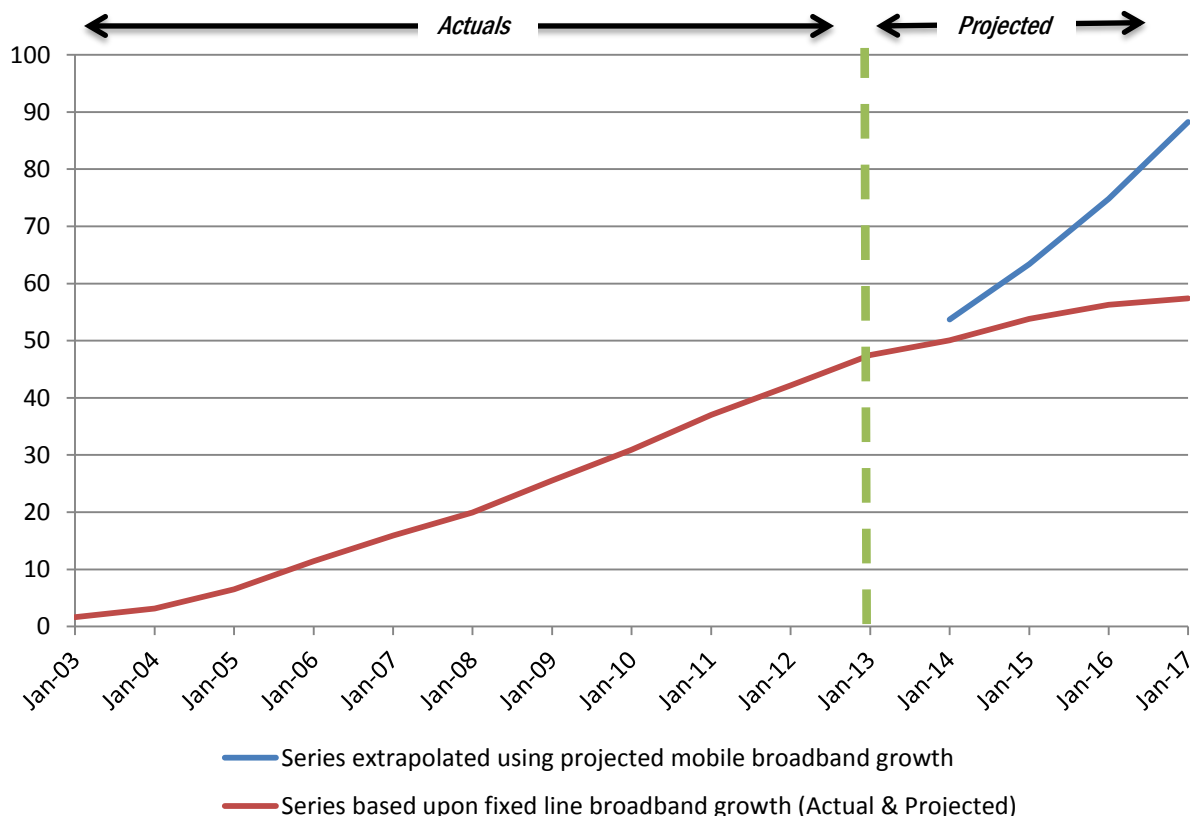
The updated Other large letter volume model includes a broadband penetration variable aimed at capturing the declining rate of such letters as a result of the increasing dynamic landscape observable since 2008.

Following that time declines in Other small letter volumes have intensified however when constructing letter volume forecasts fixed line broadband penetration growth adds little utility if set equal to very recent growth rates.

This is due to fixed-line broadband growth approaching a saturation point, as illustrated in Chart 4.1.3.1 and this plateau does not reflect the increased movements away to electronic platforms observed for the Other large letter item.

Chart 4.1.3.1

Fixed Line & Mobile Broadband Growth Index



The data source for the empirical values of this series is an index created by Diversified Specifics based upon original data from (1): Internet Activity, Australia, Dec 2010, Australian Bureau of Statistics; & (2): Snapshot of Broadband Deployment, Australian Competition and Consumer Commission with the projected values approximated by Diversified Specifics based upon recent declining trends in the index itself.

²⁹ Australian Competition & Consumer Commission (May 2011), "Australia Post draft price notification for bulk letter services Preliminary view", p.24



As evidenced within Table 4.1.3, anticipated growth is expected in LTE 4th generation technology (of which Australia is an adopter), localised mobile data traffic, tablets and next generation smartphones.

Forward projections on each of these indicators suggest aggressive increases in the anticipated rates of mobile broadband traffic.

Such data is therefore deemed to be more appropriate as a proxy for capturing the intensified impact of electronic substitution relative to any fixed-line broadband projections.

Table 4.1.3 Forecast Growth in Mobile Technologies

	LTE Subscriber Growth*	Asia Pacific Mobile Data Traffic [^]
Dec 2013	122%	113%
Dec 2014	88%	90%
Dec 2015	61%	81%
Dec 2016	56%	74%
Dec 2017	50%	65%

* LTE subscriber growth forecast from 2012 to 2017, Informa Telecoms & Media

[^] Cisco, 2012, p.24

Despite the availability of such forward projections, obtaining a reliable composite time series comprised of historical observations on fixed and mobile broadband is challenging.

In particular, as it is difficult to obtain robust historical data on mobile broadband the approach is to construct an exponential function on the anticipated growth in this variable based upon a range of relevant externally sourced projections similar to those presented in Table 4.1.3.

Indeed, as previously noted future observations on fixed broadband growth tends to mis-specify the primary intention of the substitution variable when utilising the VECM as the basis for forecasting.

As a result, the approach adopted is to estimate the model using fixed broadband and then simulate this model for a range of broadband projections that include both fixed and mobile broadband.

This then establishes an interval for the forecasts ranging at its conservative lower limit based upon recent growth in fixed-line broadband to an upper limit premised upon the more aggressive growth rates evident within the mobile broadband space.



5. EX-ANTE FORECASTS



5.1 CAVEATS ON ECONOMETRIC FORECASTS

The use of 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 therefore supports the need for the forecast results generated by these models to be augmented by further internal and market-based intelligence.

That is, the generation of baseline ex-ante forecasts provided in this Section represents an initial step in the forecasting process.

Ultimately the baseline must be augmented via further market intelligence on the emerging trends that are not directly measurable within an econometric framework.

Further research contained within this Section has centred on the identification, measurement and collection of data to overlay onto the baseline econometric forecasts specifically in the case of the Other small letter volume segment.

As a result where possible, efforts have been made to overlay additional intelligence onto the empirical forecasts to yield a set of projections that more realistically reflect the anticipated movements in letter volumes.

The nature of developing econometric models based on historical data also suggests a need for on-going refinements and research to ensure an adequate currency of both the statistical associations and forecasts produced via the underlying econometric models.



5.2 OTHER SMALL LETTER BASELINE FORECASTS

5.2.1 Preamble

Other small letter *ex-ante* baseline forecasts are presented in Table 5.2.1 & Table 5.2.2, Chart 5.2.1 & Chart 5.2.2 in this section.

It is Table 5.2.4 however that represents the final ex-ante forecasts generated by this research undertaking.

As highlighted in the previous section, the statistically significant Other small letter volume drivers over the 2002 Q4 to 2012 Q3 timeframe are:

- Substitution: In the model substitution is captured by cheque volume data as being representative of bill payments type mail as sent via the traditional mail item. It's decline is utilised as a proxy for declines in traditional forms of bill payments; &
- Price: A combination of inflationary real price declines and nominal price increases.

5.2.2 Driver Projections Utilised

CPI projections resulting in real price changes of -2.25% over 13/14 & 14/15 as given by the Commonwealth Budget have been utilised as proxies for 2013/14 to 2014/15 real price projections.³⁰ These assumptions of -2.25% have also been assumed in the remaining years pertaining to the forecast period where projections on this variable are otherwise unavailable.

For Scenario 2 a 16.7% nominal price increase has been incorporated as at June 2014 and a 7.14% nominal price increase as at June 2017.

A cheque volume decline of 13.07% is employed and given by the rolling 12 month September 2011 to September 2012 statistic in the absence of externally available projections on this variable.

³⁰ Commonwealth of Australia (2013), "Commonwealth 2013/14 Budget - 14 May 2013", p.45



5.2.3 Econometric Baseline Volume Projections

Year on year declines in Other small letter volumes are anticipated at levels slightly below those experienced in 2011/12. These declines remain a couple of percentage points more severe than the annual decreases observed prior to the pre-global financial crisis.

Table 5.2.1 Other Small Letter Volumes - Baseline Forecasts without Price Increase

	Forecast Volume (mil)	Econometric Forecast % Growth
2013/14	1,165.29	-4.79%
2014/15	1,096.80	-5.88%
2015/16	1,031.01	-6.00%
2016/17	969.04	-6.01%

Table 5.2.2 Other Small Letter Volumes - Baseline Forecasts with Price Increase

	Forecast Volume (mil)	Econometric Forecast % Growth
2013/14	1,165.29	-4.79%
2014/15	1,046.88	-10.16%
2015/16	992.98	-5.15%
2016/17	934.24	-5.92%

Chart 5.2.1 Other Small Letter Volumes – Historical & Forecast

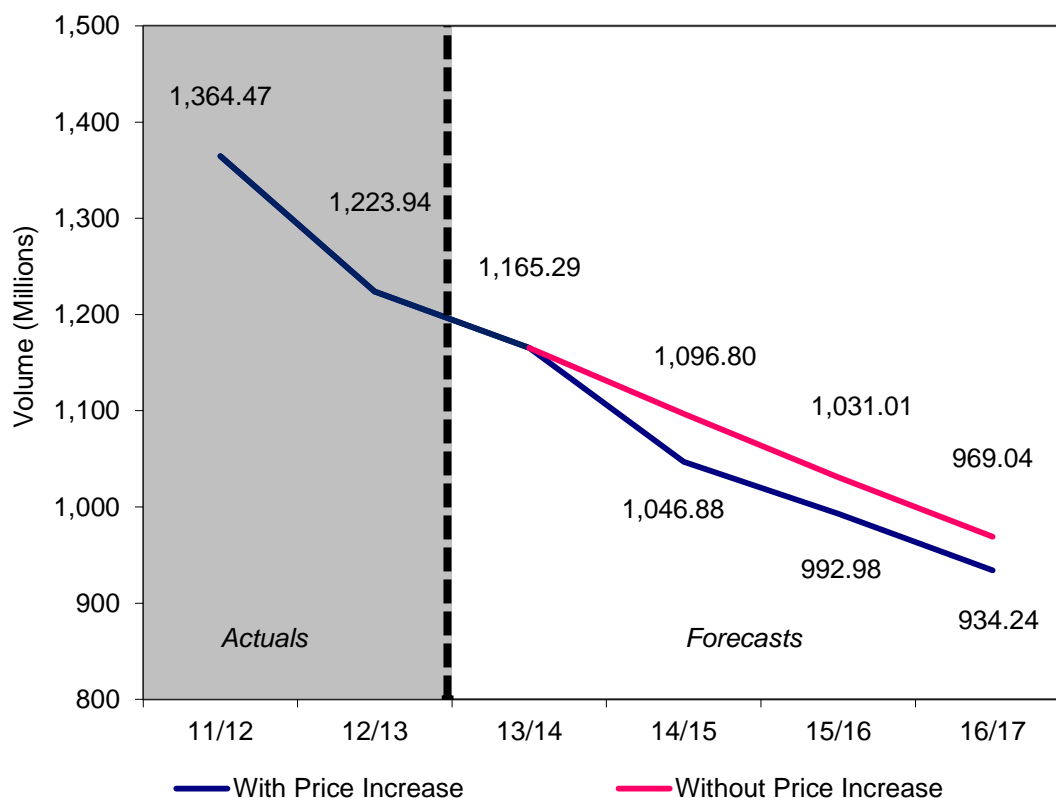
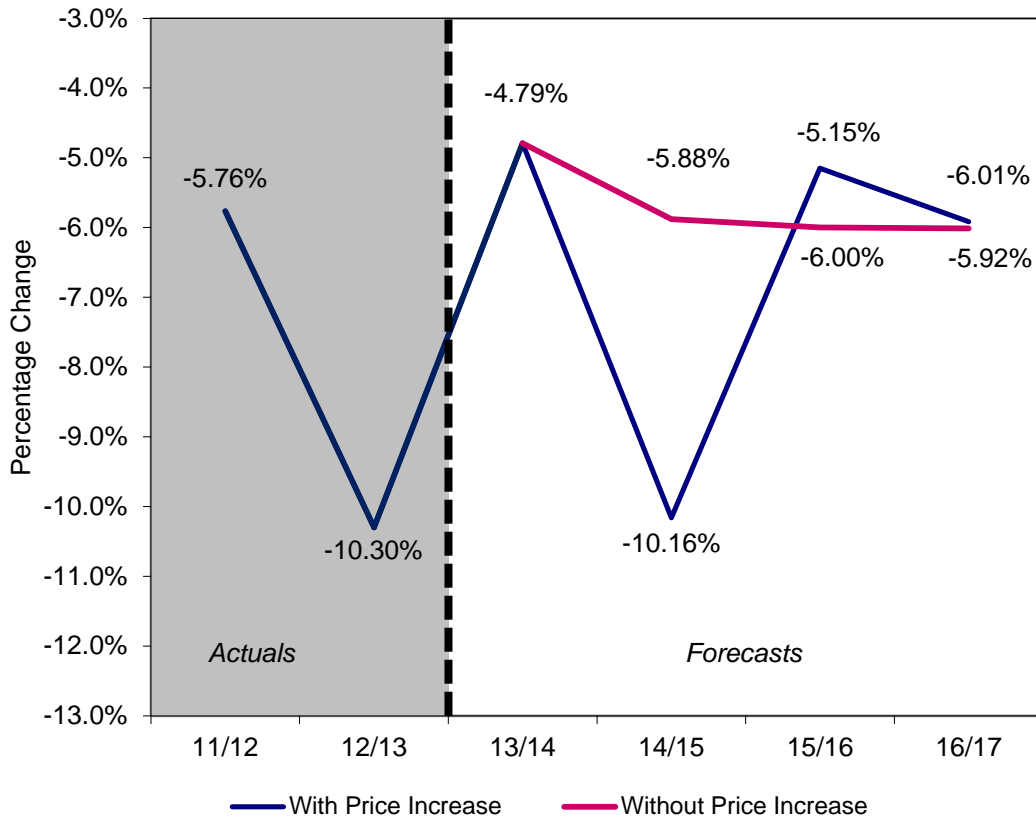


Chart 5.2.2 Other Small Letter Growth Rates – Historical & Forecast



5.2.4 Augmented Other Small Letter Volume Forecasts

The postal industry is characterised by a number of emerging trends which require further internal and market intelligence beyond that of a study that is purely empirical in nature.

The letter volume projections presented in Section 5.2.3 should therefore be seen as an econometric baseline that is a summary of historical associations only, not representative of the final *ex-ante* forecasts.

In this sub-section an extension of the forecasts are derived by overlaying emerging downside structural change pressures that are associated with the portion of bill presentment declines contained within the Other small letter product segment.

This gives rise to Scenario 3 covering economy wide effects with dual (payments and SME presentments) substitution and the addition of anticipated election related mailings.

Each of the important components of the Other small letter augmentations is discussed below.

Augmenting the Other small letter forecasts with expected Federal election mailings

Certainly there have been a number of Federal elections contained within the timeframe utilised for the construction of the econometric model for Other small letter volumes and the question then arises “Why overlay the letter volume forecasts with any anticipated Federal election effects?”

Such augmentations are of greater consequence for the out of scope PreSort Barcoded small letter volume projections and are nominal at the Other small letter volume level.



However, Australia Post’s internal analysis of Federal election type mailings suggests there has been a substantial movement towards addressed letter volumes in recent times rather than the unaddressed volumes that tended to characterise previous electoral campaigns.

This emerging change in the way constituents are contacted by mail therefore renders the use of traditional dichotomous variables as redundant when attempting to quantify the statistical significance and future impact of Federal elections within an econometric framework.

For these reasons addressed election related mail over the forecast period has been projected by Australia Post internally and based largely upon observed volumes of this type in the most recent Federal election.

In Table 5.2.4 Diversified Specifics have added these Australia Post election related mail projections to the econometric baseline on Other small letter volumes.

Augmenting the Other small letter forecasts with projections on SME bill presentments

Of greater significance to the final *ex-ante* forecasts is the proportion of owner operator and SME mail that can be attributable to the presentment of a physical invoice.

A substantial component of these invoices would tend to reside in the Other (Ordinary) small letter product segment due to the non-bulk nature of their lodgement.

Diversified Specifics, for the purposes of this example have chosen an arbitrary factor of 25% to apply to the total of Other small letter volumes given the remaining 75% is largely assumed to consist of the remaining type of mailings.

Further market research could be useful to ratify the percentage of Other small letters attributable to bill presentments and Diversified Specifics advises Australia Post to explore this option to further enhance the robustness of the final forecasts.

Assuming 25% of Other small letter volumes are invoices and statements, then the rate at which they are being substituted towards electronic bill presentment platforms may be approximated by existing research as generated by Billentis.

Table 5.2.3 Estimated annual volume increase in electronic bills/invoices³¹

Recipient Segment	World	Europe
Consumer	20%	20%
Business		29%

To derive an approximation of the quantity of SME invoicing volume substitution the world growth rate in electronic bills and invoices from Table 5.2.3 is then applied each year until 2016/17 to the 25% proportion of Other small letter product segment volumes as given by the econometric forecasts.

³¹ Billentis (2013), “E-Invoicing E Billing - The catalyst for AR/AP Automation”, p.8



Final Other small letter volume ex-ante forecasts

Table 5.2.4 then illustrates the augmentation process and the final ex-ante forecasts for the Other small letter volume product segment at Australia Post.

Table 5.2.4 Augmented Other Small Letter Volume Projections

	VOLUME (M)				
	2012/13	2013/14	2014/15	2015/16	2016/17
Scenario 2 Other Small letter volumes with Bill payments Type Substitution; and a Nominal Own Price change of 16.7% in April 2014.	1223.94	1165.29	1046.88	992.98	934.24
Minus					
Other Small letter SME bill presentment type substitution		-58.26	-110.61	-160.26	-206.97
Plus					
Other Small letter election effects Estimates Provided by Australia Post		1	1	0	1
Scenario 3: Other Small Letter Volumes Augmented Final Projections		1108.03	937.27	832.72	728.27
Final Other Small Letter Volume Growth Rates		-9.47%	-15.41%	-11.15%	-12.54%



5.3 OTHER LARGE LETTER BASELINE FORECASTS

5.3.1 Preamble

The statistically significant Other large letter volume drivers over the 2008 Q1 to 2012 Q4 timeframe are:

- Substitution: In the Other large letter model, substitution is captured by the domestic broadband variable as being broadly representative of the growth in EDI technology, email transmission of larger documents and the proliferation of online form facilities; &
- Domestic Non-farm economic activity: Other Large Letter volumes are associated with movements in the general health of the economy.

As discussed in Section 4.1.3 the methodological approach utilised to project substitution across the forecast horizon must reflect Other large letter volume declines that have become increasingly pronounced since the global financial crisis of 2008/09.

Although this research undertaking assumes all structural change losses are substitutive, efforts at individually identifying the substitution, consolidation and rationalisation components could be cultivated by Australia Post to form additional intelligence that might provide further insights into the nature of the volume losses.

Acknowledging the existence of consolidation and rationalisation pressures, Diversified Specifics has defined the all Other large letter volume losses quantified under the term 'substitution' purely for the purposes of simplifying the downward trends.

5.3.2 Driver Projections Utilised

Differing scenarios on projecting the broadband connections growth rate are generated within the set of econometric forecasts.

Scenario A assumes that volumes are driven by positive rates of econometric activity whilst also assuming there is no further growth in substitution levels over the forecast period.

Scenario B assumes that volumes are driven by positive rates of econometric activity however a conservative estimate on substitution is adopted. Under this scenario the growth rate is set to the annual growth rate in fixed-line broadband connections evident across the September 2011 to September 2012 period (10.89%).

Scenario C assumes that volumes are driven by positive rates of econometric activity however a more aggressive estimate on substitution is adopted. The anticipated quarterly growth rate in mobile technologies is set at 18% for Scenario C based on a range of projections on related technologies as discussed in Section 4.1.3.

Projections on GDP growth rates utilised were 2.75% (2013/14) and 3.00% (2014/15) as given by the Commonwealth Budget.³² A constant GDP growth rate of 3% for 2015/16 and 2016/17 has been assumed by Diversified Specifics.

³² Commonwealth 2013/14 Budget - 14 May 2013 p.45



5.3.3 Econometric Baseline Volume Projections

Each of the Other large letter *ex-ante* baseline forecasts are presented in Table 5.4.1 to Table 5.4.3 which are illustrated in Chart 5.4.1 to Chart 5.4.3 and emphasise an increasing downward trend in the most likely Scenario C.

Table 5.3.1 Other Large Letter Volumes - Baseline Forecasts
Scenario A Organic Growth & No further growth in substitution levels over the forecast period

	Forecast Volume (mil)	Econometric Forecast % Growth
2013/14	155.48	-5.61%
2014/15	147.92	-4.86%
2015/16	141.89	-4.07%
2016/17	137.17	-3.33%

Table 5.3.2 Other Large Letter Volumes - Baseline Forecasts
Scenario B Organic Growth with Conservative Substitution Effects
(Based upon anticipated Annual Fixed Line Broadband Growth of 10.59%)

	Forecast Volume (mil)	Econometric Forecast % Growth
2013/14	154.46	-6.23%
2014/15	145.23	-5.97%
2015/16	137.12	-5.59%
2016/17	129.98	-5.20%

Table 5.3.3 PreSort Barcoded Small Letter - Baseline Forecasts
Scenario C Organic Growth with Aggressive Substitution Effects
(Based upon anticipated Quarterly Mobile Broadband Growth of 18%)

	Forecast Volume (mil)	Econometric Forecast % Growth
2013/14	153.25	-6.96%
2014/15	142.31	-7.14%
2015/16	131.79	-7.39%
2016/17	121.36	-7.91%

Scenario C represents the most likely set of letter volume projections due to the number of emerging mobile platforms and anticipated behavioural changes that are likely to accompany them.

Therefore a range of sensitivities were conducted around the 18% quarterly growth rate in mobile technologies adopted by Diversified Specifics.

The Other large letter forecasts for 2016/17 ranged from -7.04% when 17% quarterly growth was assumed to -10.33% when the equivalent figure was assumed to increase by 20% per quarter.

Unlike the Other small letter volume product segment there is no further off-model augmentations required for the Other large letter volume forecasts.



Chart 5.3.1 Other Large Letter Volumes – Historical & Forecast

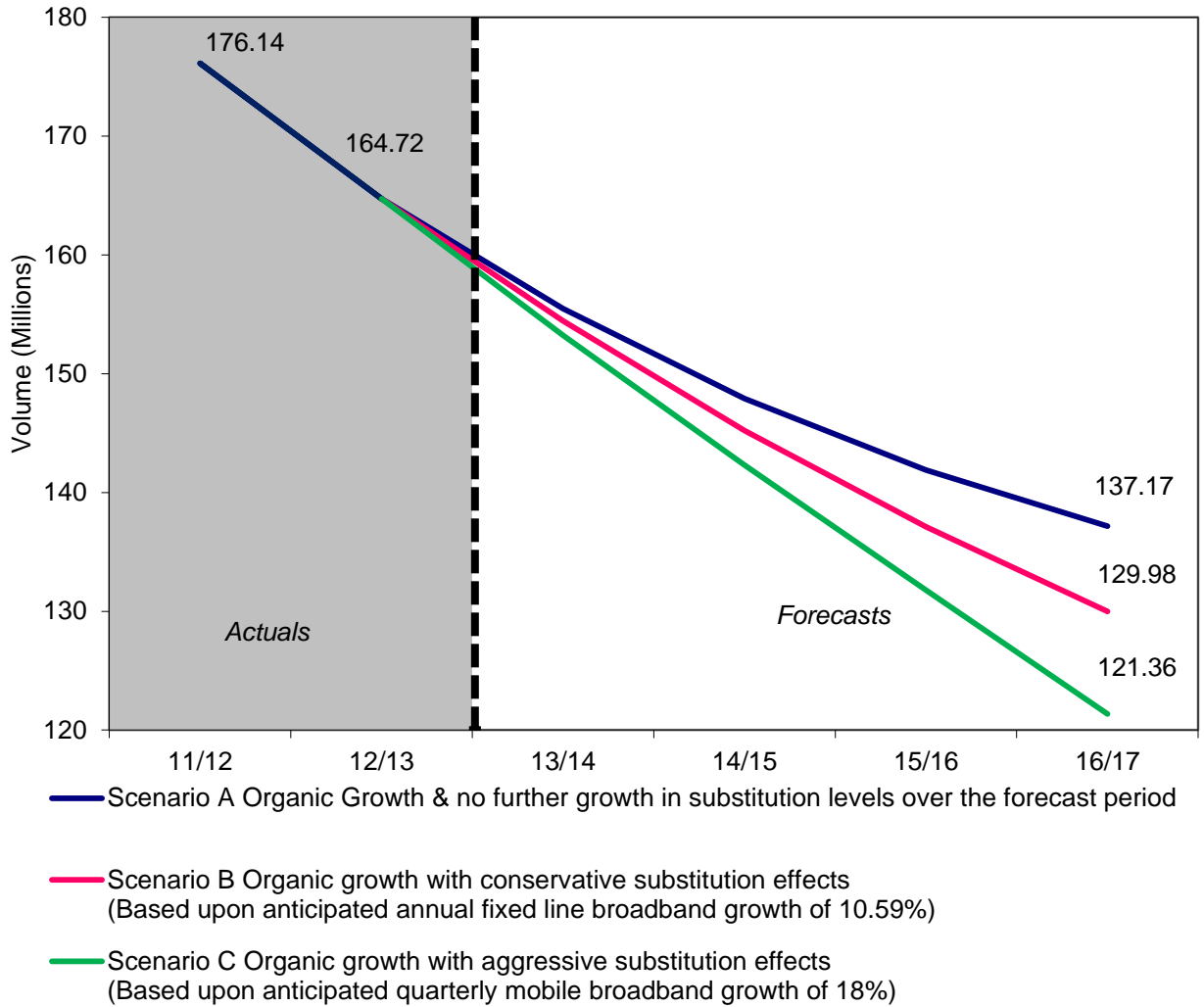
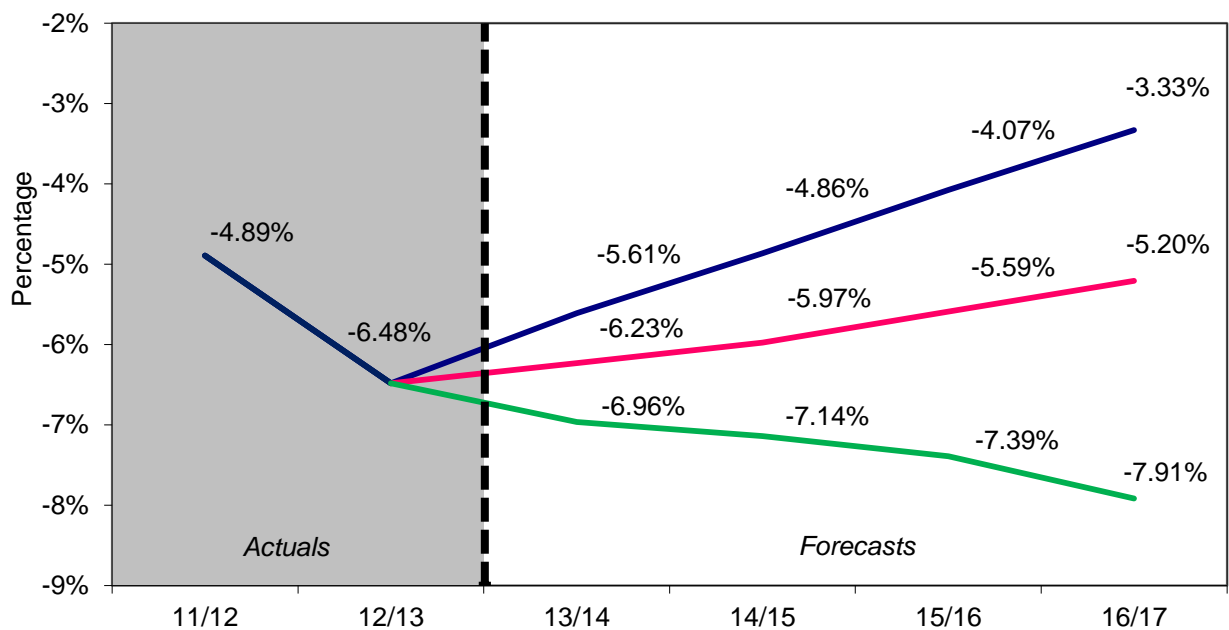


Chart 5.3.2 Other Large Letter Growth Rates – Historical & Forecast



APPENDIX A



DATA & DATA DESCRIPTIONS

Internal Australia Post Data

Australia Post supplied the following data series to Diversified Specifics:

1. Small & Large Letter Volumes;
2. Money Order Volumes; &
3. Small & Large Letter Delivery Performance

Externally Sourced Data

To facilitate association testing and the development of econometric models, Diversified Specifics obtained variables from various external sources. Each variable that was sourced and assessed is outlined in Table A.1. Variables obtained were used to test developed hypothesis in an unbiased and structured manner. Externally sourced variables outlined below that were not included in the final econometric models, were not found to be statistically significant in relation to segment-specific volumes.

Table A.1 Externally Sourced Data Descriptions

Volume Predictor	Variable	Series Timeframe Utilised (Data Frequency)	Data Source
Australian Non-farm GDP	Australian Non-farm GDP	September 1995 to December 2012 – 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
Credit Card Volumes	Credit Card Volumes	July 1995 to December 2012 – Monthly series	Number of Accounts, Credit and Charge Card Statistics - C1, Reserve Bank of Australia,
Cheque Volumes	Cheque Volumes	January 2002 to December 2012 – Monthly series	Total Number of Cheques, Cheques and Direct Entry Payments - C6, Reserve Bank of Australia,
Real Price of Other Small Letters	Real Price of Other Small Letters	September 1995 to December 2012 – 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 Other Large Letters	Real Price of Other Large Letters	September 1995 to December 2012 – Quarterly series	Nominal price of Other Large 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
Domestic Broadband Index	Domestic Broadband Index	March 2002 to December 2012 – Quarterly series	Created by Diversified Specifics. Original Data from (1): 81530DO002_201012 Internet Activity, Australia, Dec 2010, Australian Bureau of Statistics (2): Snapshot of Broadband Deployment, Australian Competition and Consumer Commission



Information Media and Telecommunications Industry	Information Media and Telecommunications Industry	September 1995 to December 2012 – 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	Finance and Insurance Services Industry	September 1995 to December 2012 – Quarterly series	Financial 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	Public Administration and Safety Industry	September 1995 to December 2012 – 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
Rental, Hiring & Real Estate Services Industry	Rental, Hiring & Real Estate Services Industry	September 1995 to December 2012 – Quarterly series	Rental, hiring and real estate services (L), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Retail Trade Industry	Retail Trade Industry	September 1995 to December 2012 – 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	Wholesale Trade Industry	September 1995 to December 2012 – 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	Health Care and Social Assistance Industry	September 1995 to December 2012 – 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 & Training Industry	Education & Training Industry	September 1995 to December 2012 – 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
Manufacturing Industry	Manufacturing Industry	September 1995 to December 2012 – Quarterly series	Manufacturing (C), Cat. No. 5206.0 Table 6 Gross Value Added by Industry, Australia, Chain volume measures, Australian Bureau of Statistics
Australian Population	Estimated Australian Population	September 1995 to December 2012 – Quarterly series	ABS Cat. No. 3101.0 Table 1. Population Change, Summary - Australia ('000)
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
The Economic Downturn	Economic Downturn	Dichotomous Variable	Internally constructed variable – Diversified Specifics



APPENDIX B



KEY STATISTICAL OUTPUTS

B.1 Other Small Letter Volumes

The preferred long-run cointegrating equation as generated via the research methodology is as follows:

Vector Error Correction Estimates
 Date: 08/12/13 Time: 13:40
 Sample (adjusted): 2002Q4 2012Q4
 Included observations: 41 after adjustments
 Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1		
LNSADJOT(-1)	1.000000		
LNSADJCH(-1)	-0.506536 (0.01278) [-39.6218]		
LNREALPR(-1)	0.236879 (0.09802) [2.41663]		
C	0.012799		
Error Correction:	D(LNSADJOT)	D(LNSADJCH)	D(LNREALPR)
CointEq1	-0.755388 (0.20493) [-3.68603]	-0.740224 (0.18017) [-4.10843]	0.045193 (0.24789) [0.18231]
D(LNSADJOT(-1))	0.046859 (0.14268) [0.32843]	0.243470 (0.12544) [1.94095]	-0.106386 (0.17259) [-0.61641]
D(LNSADJOT(-2))	-0.184243 (0.12166) [-1.51439]	0.060829 (0.10696) [0.56869]	0.283316 (0.14717) [1.92515]
D(LNSADJCH(-1))	-0.482443 (0.21973) [-2.19557]	-0.672113 (0.19319) [-3.47911]	0.126003 (0.26580) [0.47405]
D(LNSADJCH(-2))	-0.045180 (0.21292) [-0.21219]	-0.472108 (0.18719) [-2.52201]	-0.247028 (0.25756) [-0.95912]
D(LNREALPR(-1))	-0.247454 (0.14655) [-1.68850]	0.164158 (0.12885) [1.27407]	-0.004485 (0.17727) [-0.02530]
D(LNREALPR(-2))	-0.042744 (0.14387) [-0.29710]	-0.063406 (0.12649) [-0.50129]	-0.053189 (0.17403) [-0.30563]

C	-0.028176 (0.00851) [-3.31123]	-0.050165 (0.00748) [-6.70549]	-0.001242 (0.01029) [-0.12068]
R-squared	0.534146	0.396064	0.179859
Adj. R-squared	0.435329	0.267956	0.005890
Sum sq. resids	0.013341	0.010312	0.019521
S.E. equation	0.020107	0.017677	0.024322
F-statistic	5.405382	3.091648	1.033858
Log likelihood	106.4480	111.7276	98.64496
Akaike AIC	-4.802343	-5.059883	-4.421705
Schwarz SC	-4.467987	-4.725527	-4.087350
Mean dependent	-0.013939	-0.025009	0.000191
S.D. dependent	0.026757	0.020661	0.024394
Determinant resid covariance (dof adj.)	6.72E-11		
Determinant resid covariance	3.50E-11		
Log likelihood	318.9940		
Akaike information criterion	-14.24361		
Schwarz criterion	-13.11516		

B.2 Other Large Letter Volumes

The preferred long-run cointegrating equation as generated via the research methodology is as follows:

Vector Error Correction Estimates
Date: 11/18/13 Time: 09:55
Sample: 2008Q3 2012Q4
Included observations: 18
Standard errors in () & t-statistics in []

Cointegrating Eq:	CointEq1		
LNSADJOT(-1)	1.000000		
LNDOMEBR(-1)	0.485841		
	(0.06518)		
	[7.45349]		
LNSADJNO(-1)	-1.146688		
	(0.35149)		
	[-3.26238]		
C	3.139498		
	(3.65065)		
	[0.85998]		
Error Correction:	D(LNSADJOT)	D(LNDOMEBR)	D(LNSADJNO)
CointEq1	-0.042582	0.163144	0.285239
	(0.29604)	(0.08619)	(0.05427)
	[-0.14384]	[1.89279]	[5.25619]
D(LNSADJOT(-1))	-0.586443	-0.015921	-0.096497
	(0.27858)	(0.08111)	(0.05107)
	[-2.10514]	[-0.19630]	[-1.88967]
D(LNDOMEBR(-1))	-0.061388	0.794267	-0.798592
	(0.76792)	(0.22358)	(0.14077)
	[-0.07994]	[3.55252]	[-5.67319]
D(LNSADJNO(-1))	-0.307231	0.871799	-0.483344
	(0.82913)	(0.24140)	(0.15199)
	[-0.37054]	[3.61142]	[-3.18016]
ECONDOWN	-0.021086	-0.026057	-0.003279
	(0.02580)	(0.00751)	(0.00473)
	[-0.81725]	[-3.46875]	[-0.69338]
R-squared	0.418897	0.846606	0.744252
Adj. R-squared	0.240096	0.799408	0.665560
Sum sq. resids	0.011675	0.000990	0.000392
S.E. equation	0.029967	0.008725	0.005493
F-statistic	2.342810	17.93725	9.457821
Log likelihood	40.52553	62.73615	71.06408
Akaike AIC	-3.947281	-6.415128	-7.340453
Schwarz SC	-3.699956	-6.167802	-7.093127
Mean dependent	-0.018786	0.041176	0.005454
S.D. dependent	0.034377	0.019481	0.009499

Determinant resid covariance (dof adj.)	1.55E-12
Determinant resid covariance	5.85E-13
Log likelihood	176.8749
Akaike information criterion	-17.54165
Schwarz criterion	-16.60181

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