

Institute of Actuaries of Australia

An Actuarial Approach to Measuring Media Effectiveness

Prepared by Adam Driussi, David Isaacs & Tony Davis

Presented to the Institute of Actuaries of Australia 2005 Biennial Convention 8 May – 11 May 2005

This paper has been prepared for the Institute of Actuaries of Australia's (Institute) Biennial Convention 2005. The Institute Council wishes it to be understood that opinions put forward herein are not necessarily those of the Institute and the Council is not responsible for those opinions.

© The Quantium Group 2005

The Institute of Actuaries of Australia Level 7 Challis House 4 Martin Place Sydney NSW Australia 2000 Telephone: +61 2 9233 3466 Facsimile: +61 2 9233 3446 Email: insact@actuaries.asn.au Website: www.actuaries.asn.au

An Actuarial Approach to Measuring Media Effectiveness

1.	The Media Market	1
2.	Case Study – MortgageCo	7
3.	Approach	12
4.	Modelling Results	23
5.	Model Applications	28
6.	Conclusions	34

1. The Media Market

Advertising and promotion spend often represents one of the largest and most conspicuous lines of company expenditure, yet it is still relatively unaccountable. The financial results of advertising spend are rarely measured with the same degree of rigour and science as other lines of expenditure. Marketers have traditionally measured results in terms of the relatively qualitative brand measures of customer awareness and consideration.

Quite often, very little science is applied to the planning of media investments going forward, whether it be the optimisation of media utilisation or simply the accurate forecasting of sales results.

This is a problem which has been around for a long time. As Lord Leverhulme (one of the founders of Lever Brothers), famously commented:

"I know that half of my advertising is wasted, I just don't know which half."

1.1. Background

The Australian media market continues to increase in sophistication, complexity and competitiveness. Changing social behaviours, combined with the proliferation of consumer choice in media consumed, has led to the fragmentation of mass audiences into countless personal audiences or niches.

An increasing demand for accountability of marketing investments compounds this complexity. Many media owners and agencies, however, have been slow in demonstrating the empirical strengths and weaknesses of different mediums and many existing models of media effectiveness within the marketplace have a number of limitations.

1.2. Media Spend

Australian companies spent over \$10.4bn on advertising in 2004, up from \$9.4bn in 2003. Indeed, as Figure 1.1 below shows, with the exception of the impact of the Sydney Olympics in 2000, the amount spent on advertising has been increasing by approximately 7% per annum for the past 15 years and now accounts for approximately 1.1% of Australia's GDP.





Source: Commercial Economic Advisory Service of Australia 1: Excludes online advertising

By comparison, the top 4 advertisers in the US spent almost A\$11.5bn between them in 2004.

On a per capita basis, however, Australian advertisers spent US\$320 per capita – roughly 60% of that in the US but similar to that in Japan, over 20% higher than that in the UK and almost 75% higher than that in Canada.

Australian advertisers spent a further \$388m on online advertising during 2004, an increase of 64% over the previous 12 months. Most of the major players in the media market expect this strong growth to continue.

As Figure 1.2 shows, metropolitan television and metropolitan papers dominate media expenditure share by media channel, accounting for over 40% of total advertising spend between them. Online advertising currently makes up 3.6% of total spend, but is forecast to increase to 6.5% over the next three years.





Figure 1.3 below sets out the top ten advertisers in Australia during 2004. Coles Myer, through brands including Myer Stores, Coles Supermarkets, Kmart, Target, Officeworks and Liquorland was the highest spending organisation, spending over \$190m on advertising in 2004. This was almost double that of the next highest spending organisation, Nestle.

In comparison, the highest spending organisation in the US during 2004, Proctor & Gamble, spent A\$3.88bn.

Rank '04	Rank '03	Advertiser	'04 Spend (\$m)	Key Products
1	1	Coles Myer	190-195	Myer, Coles, Kmart, Target, Officeworks, Liqourland
2	4	Nestle Australia / L'Oreal	100-105	Nescafe, L'Oreal, Garnier, Milo
3	3	Woolworths	95-100	Woolworths, Safeway, Big W, Dick Smith
4	2	Telstra	90-95	Telstra Shop, BigPond, Telstra Mobile
5	5	Commonwealth Government	90-95	Medicare, Violence Against Women, AEC, Medibank
6	6	Harvey Holdings	85-90	Harvey Norman, Domayne, Rebel Sports
7	7	Toyota	75-80	Toyota, Lexus, Daihatsu
8	22	Proctor & Gamble	60-65	Head & Shoulders, Pantene, Olay, Vicks
9	9	NSW Government	55-60	RTA, Tourism NSW, Lotteries, Water Corporation
10	8	General Motors Holden	55-60	Holden

Figure 1.3 – Highes	st Spending	Advertisers	in	2004
---------------------	-------------	-------------	----	------

Source: Nielsen Media Research AdEx.

Source: Commercial Economic Advisory Service of Australia

Overall, the retail industry is by far the largest advertising category for Australian media, accounting for 17% of total spend and more than double the next biggest category (motor vehicles). The finance industry ranks fifth behind entertainment and food.

The highest spending financial institution in 2004 was the Promina Group, spending an estimated \$40-45m and ranking 25th overall. The only other financial institutions in the top 50 advertisers in 2004 were the Commonwealth Bank of Australia (\$35-40m and 32nd overall) and Insurance Australia Group (\$25-30m and 43rd overall).

1.3. Media Penetration

It is estimated that consumers see 10,000 advertising messages per day. This remarkable figure is a result of the enormous variety of communications media used by advertisers today. In particular:

- 99% of Australian homes have television with over 60% of homes having two or more sets;
 - Over 25% of Australian homes also have pay television, which is forecast to grow to 40% over the next two years.
- Newspapers reach approximately 84% of Australia's population each week with a combined Metropolitan daily circulation of 2.3 million (3.4 million on Sundays);
 - 65% of Australians read a Metropolitan daily newspaper;
- There are 257 commercial radio stations on-air in Australia. In an average week, commercial radio reaches 78% of Australians;
 - The average Australian aged over 10 spends almost 20 hours per week listening to radio, increasing to almost 24 hours per week for people aged 55 or older;
- The reach of magazines as an industry continues to increase;
 - There have been over 300 magazine launches since 1990 leading to a 75% increase in the number of titles;
 - Australians over thirteen buy 21 magazines per year on average and 43% of children aged six to thirteen read a magazine monthly;
 - Women's Health and Lifestyle magazines account for 68% of total magazine sales;

- Not surprisingly, online advertising is predicted to explode as an advertising medium. Approximately 75% of Australians have internet access, with almost 50% of the home internet population now having broadband;
- There are a countless additional mediums such as in store promotions, sponsorships, outdoor, cinema, ambient (from pavement to sky writing), product placement in movies, etc.

1.4. The Need for Accountability

Increasingly, marketers are being held more accountable for their marketing investments. Advertisers across the board are seeking more robust data to support their spending decisions.

Many existing media effectiveness models, however, suffer from a number of limitations:

- They often include subjective inputs, with limited specific understanding of the advertiser's previous activity and directly related results;
 - for example, assumptions are often based on the *perceived* strength of each medium;
- There is limited separation in the modelling between brand building and response objectives, making it very difficult to develop an understanding of the return being generated on marketing investments – either in the short term or longer term;
- There is often no explicit relationship identified between cause and effect;
- Many models focus predominantly on television, which, whilst an important medium, still accounts for less than 30% of total media spend;
- There is typically a limited feedback loop (or control cycle) to assess the on-going effectiveness of the modelled programme;
- Model outputs often require interpretation by the client to be translated into a specific media schedule; and
- The models are typically offered by media agencies who are incentivised through their remuneration structures to maintain and grow media expenditure!

An actuarial approach to modelling media effectiveness can overcome the majority of these limitations.

The Challenge for Marketers

The types of questions marketers are increasingly being asked include:

- What is the relationship between marketing investment and sales revenue?
 - If I stopped advertising, how long would it take for my sales levels to drop?
 - If I halved my advertising spend what would happen to my volume of leads?
 - Which components of my media activity work best (and worst)?
- Where could additional sales come from?
 - Where have I been effective at converting sales from other brands and how effective have I been?
 - Which medium generates the greatest effect and efficiency and is there more capacity in this channel?
- What is the optimal marketing investment to achieve my market share goals?
 - What is the brand versus immediate ROI trade-off in using above and below the line (for example, direct mail) marketing activity?
 - When, and through which channels, should I target my prospects?
- What is the optimal media spend by media channel, by region, in order to maximise leads or sales given a fixed spend;
- How do media strategies differ under different combinations of external market conditions, competitor activity, brand strength and offer/creative?

The remainder of this paper describes a case study of a project designed to help address a number of these challenges.

2. Case Study – MortgageCo

We have undertaken a programme of this nature with one of Australia's largest mortgage companies. We have named the client MortgageCo and whilst the methodology we adopted is accurately described, all the charts and results illustrated have been disguised to protect our client's commercial confidentiality.

MortgageCo wished to implement a robust methodology for allocating and optimising its media spend. In particular, they wished to develop a system to allow them to understand optimal media spend by media channel and by region to maximise leads generated given a fixed media spend.

MortgageCo also wished to understand how their strategy might change under different combinations of market conditions and competitor activity.

Figure 2.1 shows the various internal and external factors which drive performance outcomes for MortgageCo.





2.1. Enquiries Generated

The focus of the analysis was on predicting the volume of leads generated.

The ultimate conversion of these leads to new business was considered to be a function of factors other than media spend (e.g. range of products, quality of service, price etc) and outside the scope of our initial analysis as it was relatively stable over the period.

Figure 2.2 sets out the number of leads generated between July 2002 and April 2005.



Figure 2.2 – Leads Generated by Week

2.2. Media Used by MortgageCo Historically

As part of the analysis, we investigated the impact of the following forms of 'above the line' media activity:

- Television;
- Radio;

- Press (national, metropolitan, regional and community press);
- Magazines;
- Online;
- Other, including Cinema, Billboards, and Bus Panels.

'Below the line' activities and sponsorship activities were excluded from the analysis. As set out in Figures 2.3 and 2.4, over the past three years MortgageCo has had significant variations in both the level of media investment by month and in the mix of media utilised.



Figure 2.3 – Historical Media Spend by Category





2.3. External Influences

In addition to media activity there are a range of other factors that can potentially impact the volume of leads generated by MortgageCo and it was important to identify and control for these influences. These external influences included:

- The level of activity in the market i.e. in order to understand the impact of market driven changes in telephone enquiries we needed to build a model which predicted the total market home loan activity in each week using a range of economic variables;
- Seasonality all other things being equal, certain months generate a higher number of home loan enquiries than other months;
- Competitor activity we analysed the impact that competitor media spend by channel had on MortgageCo's lead volumes.

In practice there would be other factors which might need to be included for other organisations, depending on the product being advertised. For example, in many cases the relative strength of the product offer or price might be expected to be a major determinant of the number of sales or leads generated by a particular media campaign. In MortgageCo's case these were deemed to be less important.

3. Approach

The key purpose of our analysis was to isolate the impact of media on the volume of leads generated. A wide range of factors were tested simultaneously for their impact on this volume, including many out of MortgageCo's control.

We extracted detailed information from MortgageCo's systems including particulars relating to MortgageCo's historic media schedule and to each lead generated.

The specific methodology used to determine the impact of each factor (or group of factors) is not discussed in detail in this paper due to commercial sensitivity.

3.1. Measuring Exposure to Advertising

For each different form of advertising we required a suitable measure of the exposed population in order to quantify the response driven by that exposure. There are a variety of potential measures of exposure that are used to measure media response. These include:

- Spend The amount outlaid by the advertiser by media channel;
- Opportunities to see/hear The potential audience for the media;
- Impacts The number of audience 'hits' for the media;
- Reach The number of unique audience 'hits' for the media;
- Frequency The average number of 'hits' per audience member for the media.

Our analysis focussed on the relationship between impacts (or a population weighted measure of impacts) and the enquiries that MortgageCo received.

Each media channel has its own variation of determining impacts. The relevant measures utilised are described below:

- Television The population weighted measure for television impacts is called TARPs – Television Average Rating Points. TARPs are measured by television ratings companies such as OzTAM and AC Neilsen and can be differentiated by geography and demographic;
- Radio For radio we constructed a measure of impacts from audience listenership and geodemographic data;

- Press and Magazines For press and magazines we constructed a measure of impacts from readership statistics and geodemographic data;
- Online The relevant measure for online advertising is called impressions. For some websites where advertisements are carried on multiple pages, unique impressions is a more relevant measure;
- Cinema Cinema audiences are an appropriate measure of impacts for cinema advertising;
- Billboards RTA (and equivalent) traffic data provides the best measure of impacts for billboard advertising. It should be noted, however, that these measures tend to be more readily aligned to an opportunity to see rather than directly measuring impacts;
- Bus Panels Traffic data and relevant bus routing maps are helpful in estimating impacts for bus panels.

As the demand for robust data has increased, audience measurement methodologies have also improved significantly, particularly for mediums such as cinema and outdoor.

3.2. Media Data

Data for each of the media channels were sourced separately and there were significant differences between the veracity and completeness of the data available by media channel.

Television

For MortgageCo and each competitor we collated details of every television advertisement run between July 2002 and April 2005. For each advertisement we captured:

- City;
- Television network;
- Company;
- Product/Campaign;
- Duration of advertisement;
- Day of week;

- Date;
- Time;
- Program;
- Genre (e.g. news, comedy, sport);
- Content classification;
- Number of advertisements in break;
- Position of advertisement in break;
- Position of break in program;
- Position of advertisement relative to network promotions;
- TARPs (including by key demographics).

For each of the 94 commercial television stations in Australia (including regionals and pay television) we overlaid coverage maps to allow us to identify which of the population were exposed to each advertisement.

Figure 3.1 below sets out an extract from MortgageCo's television scheduling for the week commencing 1 September 2003.

Station	Duration	Day	Date	Time	Program	NCA Prior*	Position In Break	Number in Break	Break in Program	NCA After*	TARPs 25-54	TARPs 25-39
HSV7	30	Mon	1/09/2003	04:52pm	Seven News	Y	5	6	2	Ν	0.6	0.8
GTV9	30	Mon	1/09/2003	12:48pm	Days of Our Lives	Y	4	6	5	Ν	1.4	0.4
GTV9	30	Mon	1/09/2003	05:03pm	Burgo's Catch Phrase	Ν	2	5	1	N	10.2	9.4
HSV7	30	Tue	2/09/2003	04:52pm	Seven News at 4.30	Y	4	5	2	N	9.7	9.9
GTV9	30	Tue	2/09/2003	03:48pm	Dr. Phil	Y	4	5	5	Y	6.0	6.0
GTV9	30	Tue	2/09/2003	04:46pm	Entertainment Tonight	Y	2	5	2	Y	4.8	2.4
GTV9	30	Tue	2/09/2003	04:54pm	Entertainment Tonight	Y	3	5	3	Y	4.4	3.0
GTV9	30	Tue	2/09/2003	05:12pm	Burgo's Catch Phrase	Y	3	7	2	Y	3.8	4.2
GTV9	30	Tue	2/09/2003	10:19pm	Stingers	Ν	1	3	4	Y	2.3	2.3
GTV9	15	Tue	2/09/2003	11:47pm	Nightline	N	1	5	2	N	15.6	17.4
HSV7	15	Wed	3/09/2003	04:58pm	Inter/Prior Program	Ν	1	4	1	N	4.3	3.0
HSV7	30	Wed	3/09/2003	05:15pm	M*A*S*H	N	3	5	3	N	1.3	0.8
HSV7	30	Wed	3/09/2003	08:17pm	Hot Auctions	Ν	2	6	2	N	2.5	2.1
GTV9	30	Wed	3/09/2003	12:08pm	Days of Our Lives	Y	1	7	1	N	12.0	13.0
GTV9	30	Thu	4/09/2003	12:45pm	Days of Our Lives	Y	2	7	5	N	4.4	5.2
GTV9	15	Thu	4/09/2003	08:10pm	Getaway	Y	4	5	4	N	3.0	3.7
HSV7	30	Fri	5/09/2003	06:57pm	Today Tonight	Y	4	5	3	N	12.9	10.3
GTV9	30	Fri	5/09/2003	08:03pm	Burke's Backyard	N	1	5	3	Y	7.5	7.5
GTV9	15	Sat	6/09/2003	03:22pm	So Fresh	Y	5	6	5	Y	3.3	2.6
GTV9	30	Sat	6/09/2003	04:38pm	The Car Show	Y	6	6	2	N	3.7	4.7
GTV9	15	Sat	6/09/2003	06:08pm	National Nine News Saturday	Ν	3	6	1	N	11.2	12.0
GTV9	15	Sat	6/09/2003	06:46pm	Australia's Funniest Home Vide	Y	7	8	2	N	10.9	10.0
HSV7	30	Sun	7/09/2003	08:22am	Sunday Sunrise	Y	3	7	2	Y	1.1	1.5
HSV7	15	Sun	7/09/2003	08:59am	Sunday Sunrise	Y	7	8	4	N	1.4	0.8
HSV7	30	Sun	7/09/2003	09:11am	Sunday Sunrise	Y	2	9	5	Y	0.9	0.6
HSV7	30	Sun	7/09/2003	04:47pm	Movie: Air Bud	Y	3	7	6	Ν	2.0	2.2
HSV7	30	Sun	7/09/2003	09:09pm	Movie: Woman On Top	Y	5	7	3	Ν	9.4	8.0

Figure 3.1 – Sample Television Schedule Extract

Radio

We collated summarised details of MortgageCo's weekly radio advertising schedule. This included:

- City;
- Number of advertisements played;
- Laydown (scheduling by day of week and time of day);
- Station;
- Genre;
- Network.

For each competitor we collated summarised details of the monthly radio advertising schedule. These incorporated:

- City;
- Number of advertisements played;
- Station;
- Genre;
- Network.

Against each profile of advertisements, we overlaid network coverage maps and audience listenership by time of day and day of week.

National, Metropolitan and Regional Press

For MortgageCo and each competitor we collated details of every print advertisement run in every national, metropolitan and regional newspaper. This covered:

- Publication;
- Company;
- Product/Campaign;
- Day;
- Date of publication;

- Page;
- Size;
- Colouring;
- Position on page.

Against each publication we overlaid distribution and readership details to determine an exposed population.

Community Newspapers

For MortgageCo we collated weekly summarised data covering advertisements lodged in community newspapers Australia-wide. This covered:

- Publication;
- Number of advertisements.

Once again, we overlaid distribution and readership details against each publication to determine an exposed population.

Magazines

For MortgageCo and each competitor we collated details of every print advertisement run in every national, metropolitan and regional magazine. These covered mainstream publications such as Cleo, Woman's Day and The Good Weekend, as well as trade publications such as Your Mortgage Magazine. The data collected includes:

- Publication;
- Company;
- Product/Campaign;
- Date of publication;
- Page;
- Size;
- Colouring;
- Position on page;

Against each magazine we overlaid distribution and readership details to determine an exposed population.

Online

We collected internet exposures in terms of impressions and unique impressions for websites with MortgageCo advertising attached.

Cinema

We collected total levels of activity for MortgageCo and competitors for their cinema advertising.

Outdoor

We collected data on the location of MortgageCo's billboards and periods of advertising. We also collected data on MortgageCo's bus panel exposure by city, route and time period.

For competitors, we collected data outlining the total level of outdoor activity.

3.3. Market Activity

In order to understand the impact of market driven changes in telephone enquiries we needed to understand the relative market strength for the duration of the modelling period. To this extent, we collected economic and market indicators including:

- Interest rates;
- Historical lending;
- Unemployment statistics;
- Market yields and equity returns;
- GDP measures;
- Inflation measures;
- Population growth statistics;
- Migration statistics;
- Housing affordability measures;

• Historical median house price movements.

We used these factors to build a model which predicted the total market home loan activity in each week. The output of this model was then used as a factor in our other models predicting lead volumes for MortgageCo.

3.4. Other Data

In addition to media and market activity there are a range of other factors that can potentially impact the volume of leads generated by MortgageCo and it was important to identify and control for these influences. These included:

- Socio-demographic factors;
- Geographic factors; and
- Seasonality.

We collected a range of additional information to isolate these external influences. In particular, we collated socio-demographic information about each of the geographical regions we analysed, including details of:

- Income;
- Education;
- Multiculturalism; and
- Household composition and family size.

3.5. Model Fitting

As with any statistical model, we want to find the most parsimonious model – i.e. the model which achieves the optimal balance between replication of historical data and simplicity through the inclusion of as few parameters as possible.

As Figure 3.2 shows, at one extreme we could simply assume that leads are independent of media – i.e. our expected number of leads each week would simply be the long term average (a single factor).



Figure 3.2 – Actual versus Predicted Leads (Using Long Term Average)

At the other extreme we could fit a model which perfectly predicts the historical experience by including every possible factor to historically influence lead volumes (known as over-fitting) but this would almost certainly ensure that our model does not accurately predict future lead volumes. We need to find a balance between adequately explaining the historical period and meaningfully predicting future lead volumes.

Modelling Using Only MortgageCo's Media Spend

One potential approach would be to construct models using MortgageCo's historical media spend as the only factor in our model. This comparison might represent the most common check of the marketer – how has my historical spend correlated with the volume of leads I've generated?

As Figure 3.3 shows, this single factor improves our model fit (versus simply taking the long term average) but is a crude predictor of lead volumes. Clearly, there are other important factors that also influence lead volumes.



Figure 3.3 – Actual versus Predicted Leads (Using Only MortgageCo Media Spend)

There are a number of reasons, however, why media spend does not make sense to include in our predictive model. Most notably, consumers are influenced by exposure to advertising, not advertising spend. MortgageCo's ability to negotiate better deals on advertising going forward will not result in fewer leads. Conversely, if market rates doubled for the same level of exposure, MortgageCo would not expect a doubling in the number of leads.

Indeed, one of the key reasons for developing a model of media effectiveness is to identify which media channels are more efficient than others (in terms of incremental leads generated per incremental dollar spent).

Modelling Using MortgageCo and Competitor Exposures by Media Channel

By analysing the exposures of MortgageCo and its competitors at a more granular level (as described earlier), we are able to predict leads with a much greater degree of accuracy. By excluding any variables relating to dollar spend we overcome the problems associated with changes in market pricing.

Figure 3.4 below sets out an example of how the model fit has improved by modelling exposures at an appropriate level of detail, even though any measures relating to spend have been excluded.



Section 4 discusses a number of the factors included in the model developed for MortgageCo.

Our final model included a number of additional factors which further improved the model fit shown above including seasonality, market strength and various socio-demographic factors.

Model Testing

The models developed were then tested rigorously against various hold-out samples and new data periods to ensure their predictive power.

3.6. Scenario Testing, Simulation and Optimisation

Once the models proved to be predictive we were able to test a range of alternative media strategies prior to implementation. In particular, we varied parameters such as the total media acquired (in terms of exposures as opposed to dollars spent), channel mix and timing to examine the effect of each strategy on predicted customer behaviour.

The natural extension of scenario testing was to find the scenario which provided the optimal outcome for a given set of objectives and constraints. A large number of simulations were run varying all the drivers of lead generation in order to find the optimal media strategy. The simulation model was constrained in order to only consider strategies in line with other business requirements.

Section 5 discusses some of the applications of the scenario testing, simulation and optimisation processes in more detail.

4. Modelling Results

This section describes a subset of the factors that we identified as being predictive for MortgaegCo. Not all factors have been shown, and the model relativities within each factor have been hidden for commercial reasons. Over 400 factors were investigated, with approximately 30 being included in our final models.

In practice, the combination of quantifying the incremental impact of each factor (and estimating the associated financial impact) against the additional cost associated with different exposure levels will enable MortgageCo to optimise its media spend going forward. For example, the incremental impact of acquiring additional TARPs for Television (and the associated financial benefit to MortgageCo) can be directly assessed against the dollar cost for acquiring those additional TARPs in the market.

The results set out in this section relate specifically to the MortgageCo case study. Whilst the same methodology can be been applied to other products and industries, each advertiser has its own unique set of circumstances that need to be allowed for and the impact of each medium (and results within each medium) will vary depending on those circumstances.

4.1. Television Related Factors

A number of Television related factors were included in our model for MortgageCo.

Not surprisingly, one of the most significant of these factors was the number of TARPs (ages 25-54) acquired in the last 8 weeks. As shown in Figure 4.1, as the number of TARPs acquired increases, the expected number of leads also increases, levelling out beyond a certain point.



Figure 4.1 – Impact of Number of TARPs (Ages 25-54) in the Last 8 Weeks

Even within a particular media category, there are likely to be certain biases towards particular scheduling or placement that will most effectively reach potential customers. However, when a media buyer purchases 100 TARPs for television for a target demographic, there is no guarantee that they are reaching the right subset of that target demographic, at the right time in their decision making process, or when they are in the right frame of mind to be amenable to the advertisement.

Some of the specific television related factors which we identified as influencing leads volumes (all other things being equal) included:

- Television Network certain networks were more effective in different regions for the same level of TARPs acquired;
- Region certain capital cities generate more leads for MortgageCo from television advertising than other cities;
- Day Part certain day parts have historically offered MortgageCo the best response for a given level of TARPs relative to other day parts;
- Genre certain genres generate more or less leads for MortgageCo than would otherwise be expected;
- Day of the Week controlling for all other factors, certain days of the week are more effective in generating leads for MortgageCo;

- Duration of Advertisement advertisements of different durations generate different levels of leads per TARP;
- Position in Break different positions in the advertisement break are more effective than others.

4.2. Radio Related Factors

Similar to television, as shown in Figure 4.2 we found that the number of leads generated increased with the number of radio ads per 1,000 people in the last 4 weeks. This was in addition to the impact of radio advertising in prior periods.



Figure 4.2 - Impact of Number of Radio Ads per 1,000 People in the Last 4 Weeks

4.3. Press and Magazine Related Factors

A number of factors relating to both MortgageCo's press and magazine advertising and that of MortgageCo's competitors were included in our models. Two of these factors are set out below. Figure 4.3 shows how MortgageCo's leads decreased with the size of their most expensive press advertisement in the past 4 weeks (in addition to other factors relating to press advertising in the period).



Figure 4.3 – Impact of Most Expensive Press Advertisement in the Last 4 Weeks

Figure 4.4 illustrates the impact that MortgageCo's magazine advertising in the last 14 days had on the volume of leads generated.





4.4. Online Factors

Figure 4.5 below shows the impact of online impressions in the past 7 days. We found a direct relationship between the number of impressions and the number of leads generated.





5. Model Applications

By properly understanding the relationship between media activity and sales, marketers can make informed and quantifiable decisions around what is often their largest and most subjective budget item.

The media model developed for MortgageCo has a number of applications. Some of these are described briefly below.

5.1. Strategic Media Allocation

The first use of the modelling for MortgageCo was to determine the optimal media mix by region by month. With a budgeted media spend measured in millions and the cost of acquiring each customer in the hundreds of dollars, the leveraging of greater efficiencies in promotional activities can be dramatic – whether it be a budget reduction of say 10% or thousands of additional customers for the same spend.

Different media channels offer different levels of response per exposure and typically most media channels do not operate in isolation. Consumers respond best to combinations of advertising rather than from a single channel. Nevertheless, advertisers can receive significant discounts by buying substantial volumes of advertising from one channel or media owner.

In addition, the cost of each media channel can change quite dramatically. For a given level of exposure, the cost of television tends to be more expensive in the lead up to Christmas and during election campaigns for example, than at other periods throughout the year.

Similarly, different products may have seasonality in their sales patterns, meaning that a consistent level of exposure may naturally lead to fluctuating levels of sales. These seasonal fluctuations may be truly market driven, or may in fact be driven by historical marketing activity.

Being able to quantify the impact of each media channel allows us to identify the optimal allocation of media activity throughout the year, at varying levels of spend. If the seasonal trends for the product are different to the price fluctuations driven by the cost of the marketing activity, it is possible to exploit this as part of a strategic media allocation.

Figure 5.1 sets out an illustration of a strategic media allocation for a particular region.



Figure 5.1 – Illustration of Optimal Media Spend by Channel by Month in Perth

5.2. Tactical Media Allocation

Over a short time period, such as a month, there may be a shortfall in sales activity for small geographic pockets that require more localised media activities to improve results.

In particular, we found that certain mediums generate immediate responses whilst other mediums require sustained activities over a longer period before they generate significant lead volumes.

Understanding the 'response curve' of each medium in this way, combined with understanding the known historical response of different socio-demographic customer groups to particular activities, enables MortgageCo to choose the most appropriate media activities for short term tactical purposes.

In formulating this short term allocation, we also need to take into account that certain media channels, such as community newspapers and local radio, can be utilised within a small geographic area, whilst others, such as online and national newspapers, affect larger geographies.

5.3. Optimising Flighting Patterns

The media model developed can also be used to optimise the flighting patterns, that is, the distribution of advertisements over time, for an advertising campaign. As an example, it allows planners to identify whether heavy advertising on multiple media channels at once for a shorter period of time is more effective than a less intensive, but sustained campaign on multiple channels or a brief television campaign followed by a longer radio campaign.

Figure 5.2 below illustrates at a high level how different flighting patterns may lead to different levels of expected leads over time. In practice, the scenarios tested need to cover multiple mediums and time periods as opposed to the simple illustration below.



Figure 5.2 – Impact of Flighting Pattern on Expected Lead Volumes

5.4. Negotiating Media Placement

Knowing the impact of advertising with different media owners can give media buyers a significant advantage in their negotiating placement of advertisements.

Media buyers tend to be able to negotiate better rates for larger spend with a single media owner, particularly for television and radio exposures. For example, agreeing to spend an entire television budget with Network Ten would achieve a better discount and increased TARP bonus allocation than having the same budget spread evenly between three commercial networks.

However, even for the same level of TARPs with the same target audience, different networks provide different levels of leads. Understanding which mediums, and providers within those mediums, provide the most efficient spend gives the media buyer an enormous bargaining tool which can be used to play off media placement deals from each network against each other. Ultimately this can extend to create a bias in the schedule to skew the purchased exposures towards those that offer the greatest returns.

As an example, in the case of MortgageCo we were able to identify which television networks provided the highest return on marketing investment in each region, enabling MortgageCo to use this information in the negotiation process if required.

5.5. Determining Supply Side Strategies

By understanding which customers are most easily influenced by marketing activity, media buyers can adjust their supply side processes to optimise their sales efficiency. Equally, by understanding the expected number of leads in each region (or postcode) for a given media strategy, sales force locations and distribution processes can be realigned to match where the company expects the greatest expected return on its marketing activity – both cost of sales and the value of resulting new business.

Figures 5.3 and 5.4 set out examples of outputs which might help in determining these strategies. Note that the actual figures shown by region have been reordered for confidentiality reasons.

Figure 5.3 sets out the expected number of leads in each region for a given media strategy, whilst Figure 5.4 breaks down the same results by postcode within a particular region. In each case, these outputs enable MortgageCo to

ensure that they have the right balance of advisors in each area, to meet expected lead volumes.

Brisbane City South Queensland North Queensland Sydney City Sydney North Sydney West Newcastle Wollongong Canberra Northern New South Wales Southern New South Wales Melbourne City Melbourne East Gippsland Victoria Country Adelaide SA Country Perth WA Country Tasmania Northern Territory

Figure 5.3 – Predicted Number of Leads by Region





5.6. Measuring Sales Driven by Brand

By extracting the impact of media on short term sales, we are able to identify the volume of sales generated by the existing strength of the brand. This allows us to estimate the contribution to future sales derived from the brand itself. It also allows us to effectively allocate and justify the cost of marketing activity between brand building for the long term, and short term sales activity.

Marketing strategies can then be developed to optimise the balance of activities to both build brand strength and generate business in the short term.

6. Conclusions

Companies are increasingly evaluating every line of expenditure to drive down costs. For many, the advertising budget is often a rather nebulous expense, seen as necessary to generate business, but rarely effectively measured in terms of return on investment. For the advertisers and media planners that do attempt to calculate ROI, the resulting metric is often seriously flawed – typically in favour of the "success" of their prescribed strategy and rarely suggesting a reduction in spend.

By applying fundamental actuarial principles allowing us to understand the relationship between promotional activity and sales, we can help advertisers more efficiently allocate their budgets. By properly measuring the outcomes of each media strategy, we are able to introduce a greater degree of precision and accountability to the media planning, strategy and evaluation phases of advertising campaigns.

This promises to be a significant shift in thinking for an area relatively weak at evaluating performance, but perhaps one that is well overdue. It grants advertisers a greater confidence that their media budget is being utilised to best meet their strategic goals and ensures that advertising budgets can be justified on an ROI basis as robustly as any other key item of expenditure.