

Who is watching what on subscription television?

Marion McCutcheon
Faculty of Arts, School of Media, Communication and Culture
Murdoch University

Abstract

This paper is based on research conducted for a recently-completed Australian Research Council Linkage project with the Australian Film Commission on the history of subscription television in Australia. The full results of the project will be published by the Australian Film Commission.

The policies that established the subscription television industry in Australia were substantially supply led. The regulatory framework and subsequent changes to it were influenced primarily by the television industry, bureaucrats and politicians. Little, if any, analysis has been undertaken outside the industry on demand for subscription television services and programming.

This paper aims to address this, by examining the types of programs that are offered to Australian audiences by subscription television broadcasters and what audiences watch. Of particular interest are the diversity of programming offered by subscription television services and whether a program's characteristics, including its country of production, have any significant effect on its ratings. This paper uses logistic regression analysis to model the relationship between a program's characteristics and its eventual ratings share. This approach provides more information than averages alone – it yields insight into the relative importance of the influence of a program's characteristics on its eventual ratings shares.

The results suggest that the most important predictor of whether a program will achieve a high ratings share is the channel on which it is broadcast. The growth in the number of channels available to pay television subscribers through digitisation may have increased the importance of this effect as subscribers limit their viewing within a plethora of choices. The results also suggest that a program's country of origin is not an important determinant of its popularity. Thus, a program's Australian-ness cannot be used as a predictor for lack of audience interest.

1. Content on subscription television

When Parliament was presented with the *Broadcasting Services Bill* in the early 1990s, among the promises made by the Hawke and Keating Governments were that subscription television would introduce greater choice and diversity in programming and that subscription television would provide Australian program producers with new opportunities.

To examine program diversity and local content on subscription television, this paper uses and enhances data acquired from the television ratings agency, OzTAM. The following sections describe the data and how it was extended to enable the analysis. The comparisons section compares the OzTAM data with aggregated program diversity compiled by the ABA in 2000. The second part of this paper applies the enhanced OzTAM data set to examine demand for content on subscription television in Australia.

1.1 Method

OzTAM, the ratings agency co-owned by the major Australian commercial television networks, is the primary source of ratings data in Australia. I acquired samples of OzTAM data for September 2003, June 2004 and July 2005. The first two samples were purchased in July 2004, with September 2003 being the first month for which OzTAM made subscription television ratings data available. July 2005 was the first period for which the data was available for a number of channels previously included in OzTAM's 'other subscription television' category. The data was provided on a per-program basis, and included program name, episode name (if available), time and date of broadcast and channel. Separate ratings reach and share results were provided for different demographic groups. For brevity, only the results for total households and total individuals are presented here.

Although OzTAM collects and provides information (including genre and country of origin) about television programs broadcast by free-to-air television services, it does not release similar information about subscription television programs. To remedy this, I categorised the subscription television programs included in the OzTAM ratings samples by genre and country of origin. I collected genre and country of origin data from different sources, matching the typologies used by OzTAM for free-to-air programs. The OzTAM categories are detailed and straightforward, and meet the requirements of this project:

Market researchers have conducted formal studies to identify the content characteristics that seem to polarize people's likes and dislikes. What they have generally discovered is that common sense industry categories come as close to a viewer-defined typology as anything. In simple terms, the people who like one soap opera do, in fact, tend to like other soap operas, and so on (Webster, Phalen, and Lichty 2000)

Information sources used for sorting programs into such 'common sense industry categories' included the AFC's production database, *Encore* production listings, imdb.com, subscription television channel websites, television program sales fair websites, newspaper articles and program reviews. For programs shown on both pay and free-to-air television during the sample period, I copied the free-to-air genre and country categories. For convenience, I allocated co-productions to the country in

which they were filmed, or had dominant cultural influence.¹ Programs were classified as Australian if they were produced within Australia. All Australian documentaries, drama programs and feature films were checked on the AFC's production database. Compilation programs, including music clip programs, were allocated to the country of compilation.

A very small number of programs – less than 0.0001 per cent and insignificant in sample terms – were deleted from the sample because it was difficult to locate information to categorise them. Ovation Channel was excluded from the study, even though ratings data was available, as it was very difficult for establish country of origin for many of its programs based on ratings and program information.

Some possible 'common sense categories' that could have assisted in explaining significant variation in the data were not readily available, especially for the next chapter's analysis on demand. These included whether a program was being broadcast for the first time or it was a repeat, and a program's production year. New, first-run programs, for example, may attract higher audiences than re-runs (Anderson, Swimmer, and Suen 1997).

The categorising process was very time intensive. Each sample required some months to complete. Foreign documentary and infotainment programs and sports coverage programs were among the most difficult to categorise, as they are not included in readily accessible databases and generally needed to be traced back to their individual production companies and distributors.

1.2 Subscription television programs by genre

Not surprisingly, subscription television channels mostly offer the types of programs on which their brands are based (Figure 1.1). That is, Discovery Channel mostly broadcasts documentaries, Sky News Australia mostly broadcasts news and current affairs, Showtime mostly broadcasts movies and the FOX Sports channels mostly broadcast sport.

Some genres, however, transcend channel positioning, particularly those that are subject to changes in fashion. Lifestyle, infotainment and reality television programs are currently offered by wide range of channels. Documentary channels often offer infotainment programming – for example, in July 2005, Discovery Channel broadcast the travel shows *American's Top Ten Most Expensive Hotel Rooms* and *Fantastic Houseboats* and National Geographic Channel broadcast the series *Dogs With Jobs*. Reality television also found a home on the documentary channels, with Discovery Channel broadcasting *American Chopper* and *American Casino*, and Animal Planet *King of the Jungle*. The sports channels also offer infotainment programs. ESPN, for example, broadcasts fishing and hunting programs.

¹ Generally, I allocated co-production to the country that provided the majority of the creative input, taking into account actors, director, and screenwriters.

Figure 1.1 Genre as a percentage of broadcast time by channel, July 2005^a

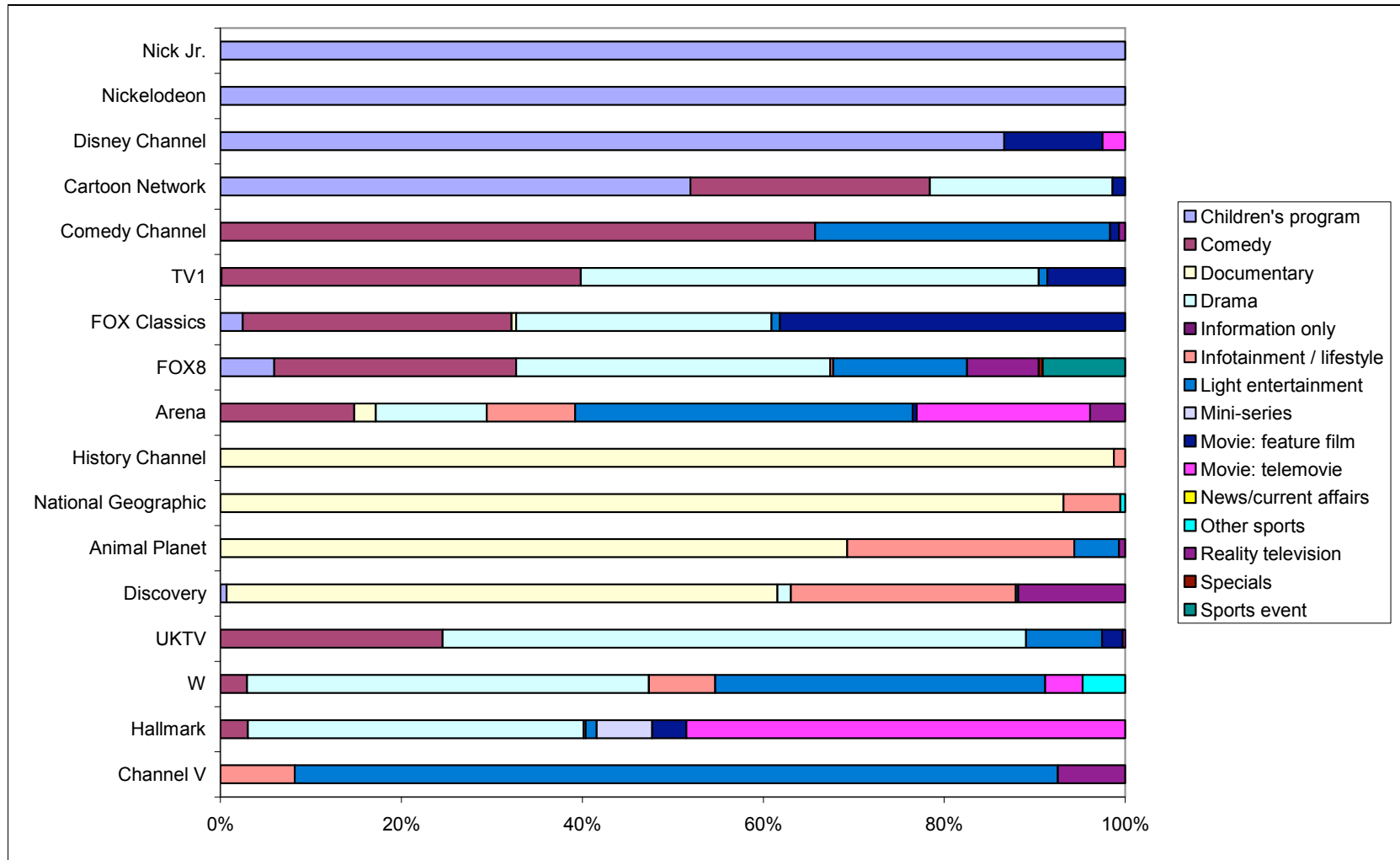
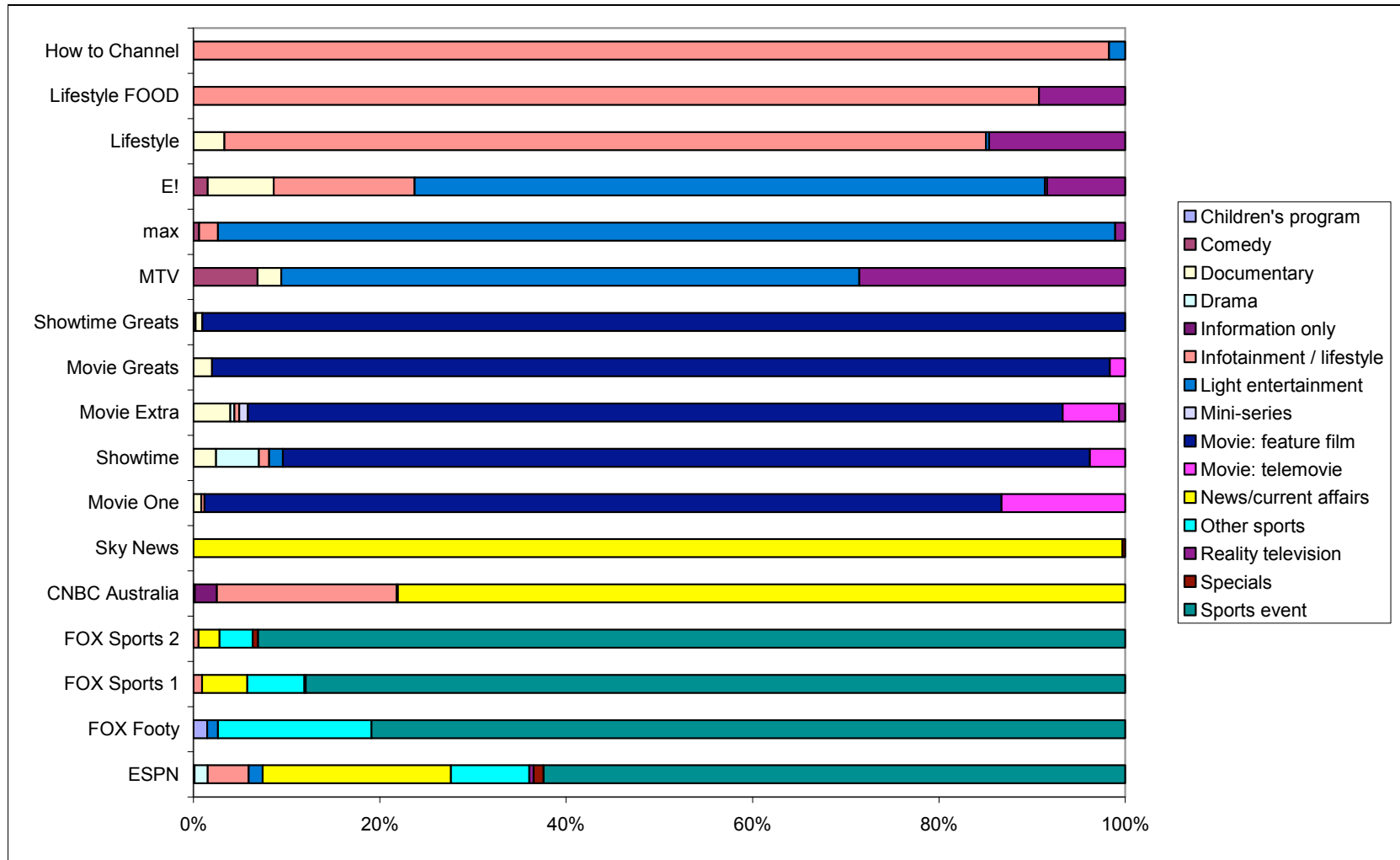


Figure 1.1 (cont.)



Note a. This figure should be viewed in colour.

Source OzTAM (2005)

1.3 Local content

Between 2003 and 2005, up to almost 20 per cent of subscription television broadcast hours were of local content (Figure 1.2, Figure 1.3 and Table 1.1). Although the overall proportion of local content available on subscription television was relatively steady during the study period, the total hours increased significantly, by about 10 per cent between September 2003 and July 2004 and by nearly 40 per cent between July 2004 and June 2005 (Table 1.1).

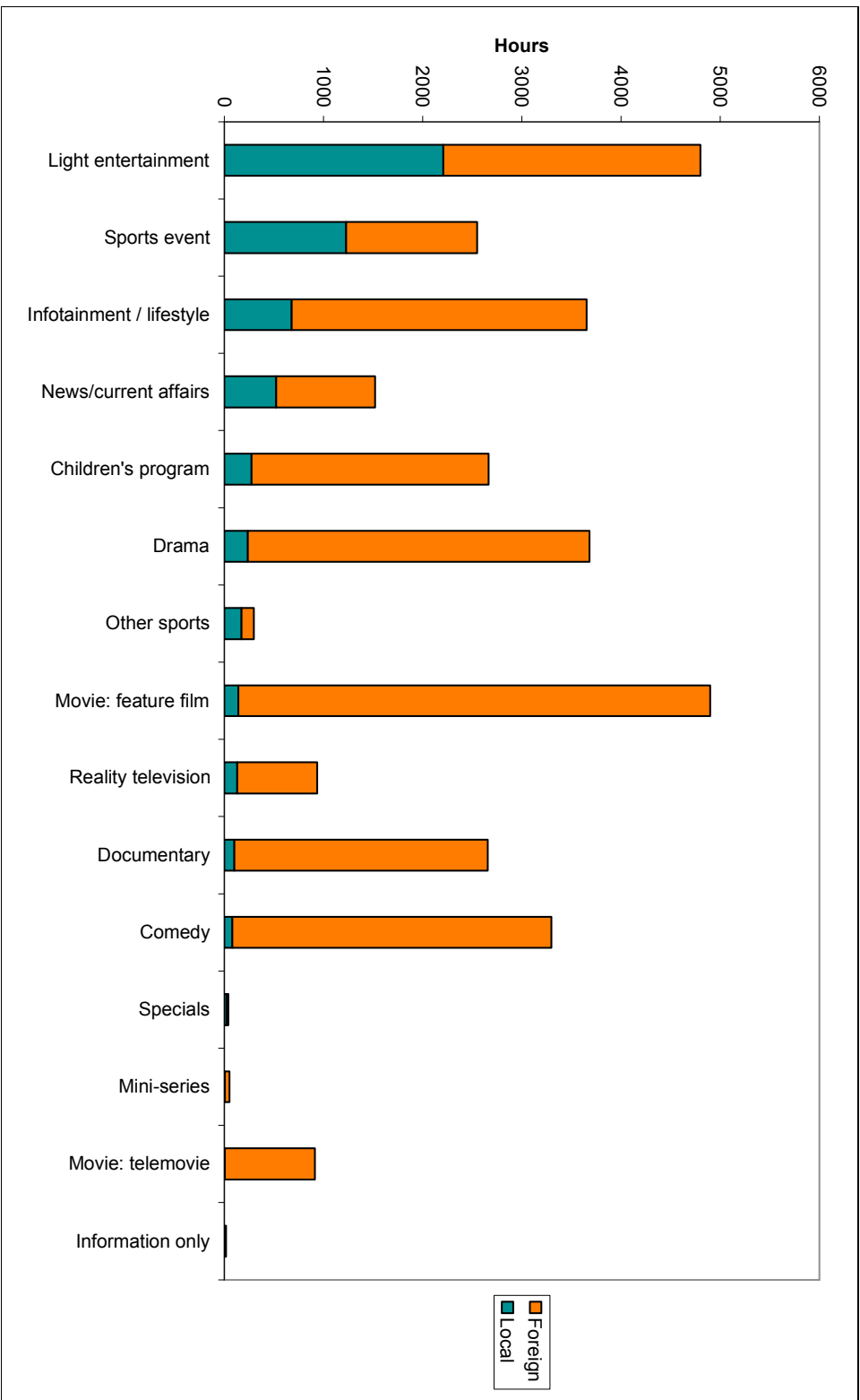
Changes in hours and proportions of local content were variable across genre, channel and over time. For example, in July 2005, local content ranged from 100 per cent of AFL games and swimming events, to three per cent of feature films. The highest numbers of hours of local content in July 2005 were for light entertainment programs (2212 hours, 46.0 per cent of light entertainment broadcast hours), sports events (1212 hours, 47.8 per cent), infotainment / lifestyle programs (668 hours, 18.3 per cent) and news and current affairs (523 hours, 34.4 per cent). Note that, in 2005, overall broadcast hour estimates for both local and foreign content increased as ratings data became available for new channels (Table 1.1).

The genres with higher amounts of local programming in the study period were those that were either less expensive to produce relative to television drama and feature films, or were re-runs of programs made for free-to-air television. The lowest proportions of local content were for genres that are costly to produce (Figure 1.2). For example, in July 2005, subscription television channels broadcast 142 hours of Australian feature films and three hours of Australian telemovies. It is, however, possible that more Australian drama, movies, children's programs and documentaries are broadcast on subscription television than would have resulted from market forces alone. Government subsidies, tax benefits, commercial television quotas and subscription television content regulation all support production of these relatively expensive genres, making more programs available for broadcast on subscription television than may have been possible without government intervention.

Genres with significant variation in local content during the study period included:

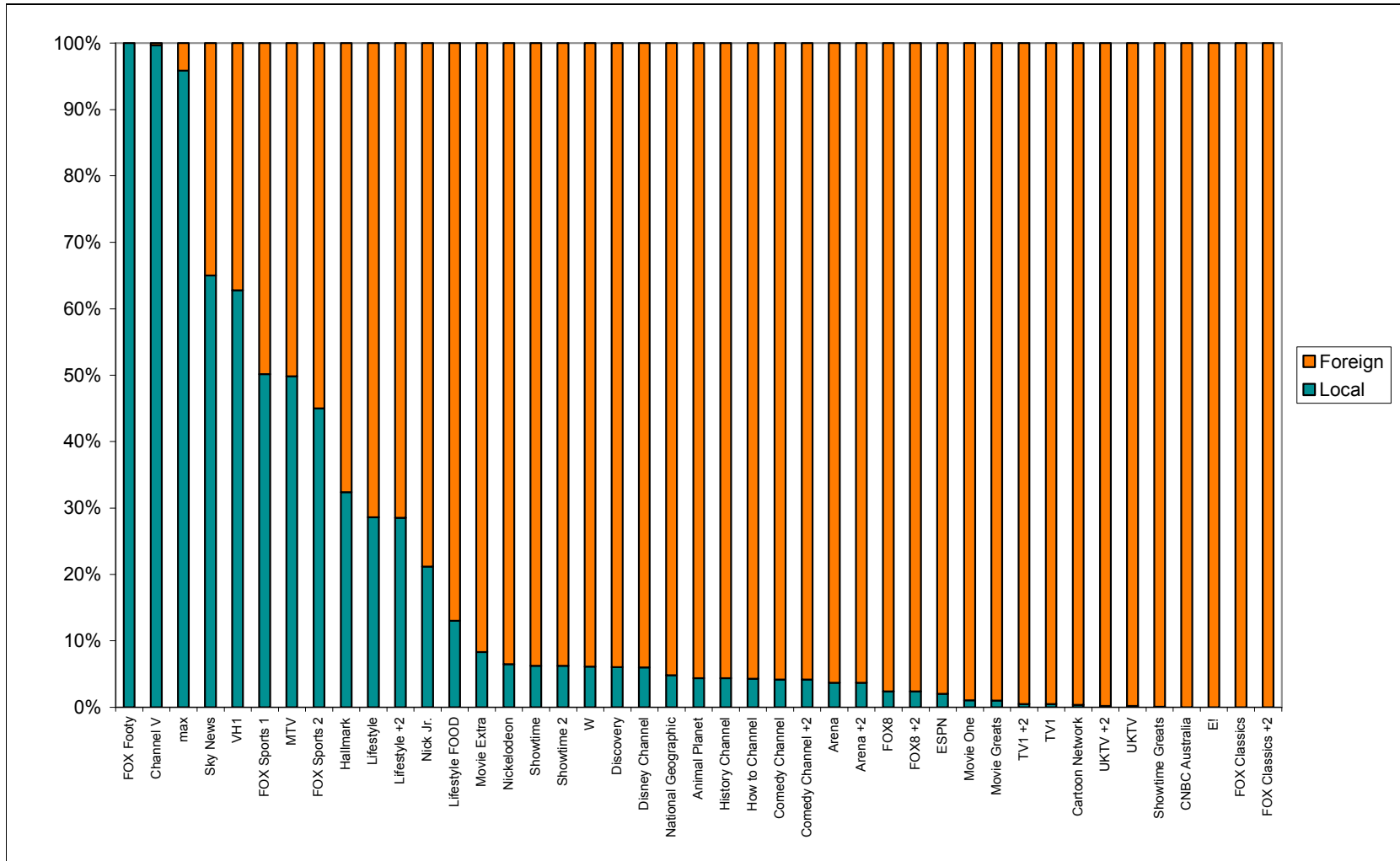
- Children's, and in particular preschooler programs, due to the launch of Nick Jr and its high levels of local content compared to the other children's channels, Disney Channel and Nickelodeon.
- Infotainment programs, particularly the other, cooking and house and garden categories, with the introduction of LifeStyle Food and the ongoing popularity of the infotainment / lifestyle genre.
- Light entertainment programming, due to the inclusion of VH1 in the ratings data and channels not previously recorded as broadcasting light entertainment programming taking up the genre.
- Local mini-series broadcast hours doubled, despite overall falls in available mini-series.
- Local feature films appear to have increased overall, albeit with some fluctuations.
- Local sports events increased, due to increases in the number of hours of cricket, AFL and league coverage. Different sports, however, vary seasonally and as the study months differ, these changes may be reflected in the ratings data.

Figure 1.2 Hours of local and foreign programs broadcast on subscription television by genre, July 2005



Source: Estimates based on OZTAM (2004; 2005)

Figure 1.3 Proportions of local and foreign content by subscription television channel, July 2005



Note Music channels that produce their own music clip programs in-house show high levels of local content, as compilation programs, including music clip programs, were allocated to the country of compilation in this analysis.

Source Estimates based on OzTAM (2005)

Table 1.1 Total program broadcast hours for local and foreign content on subscription television, September 2003, June 2004 and July 2005

Genre type 1	Local programs (hours)			All programs (hours)			Proportion of local content (per cent)		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
Children's programs	55	89	275	2054	1968	2664	3	5	10
Comedy	87	53	81	1547	1743	3297	6	3	3
Cultural ^a	1	2	0	1	5	0	100	33	n.a.
Documentary	63	143	100	2033	2602	2656	3	6	4
Drama	276	326	236	1950	1903	3682	14	17	6
Information only	7	15	0	7	16	18	100	95	1
Infotainment / lifestyle	222	328	680	1049	1294	3654	21	25	19
Light entertainment	1334	1597	2207	3151	2969	4802	42	54	46
Mini-series	3	5	7	176	109	53	2	5	13
Movie: feature film	128	103	144	3591	3487	4894	4	3	3
Movie: telemovie	2	13	7	746	832	921	0	2	1
News / current affairs	507	502	523	1331	1493	1520	38	34	34
Non-program material ^c	4	0	0	4	1	0	100	0	n.a.
Other program ^d	0	0	0	1	0	0	0	n.a.	n.a.
Other sports	55	165	175	152	230	296	36	72	59
Reality television	6	14	129	233	380	936	2	4	14
Special sports event	0	0	0	0	6	0	n.a.	0	n.a.
Specials	26	0	24	2	50	40	1265	0	60
Sports event	1026	847	1226	2057	2484	2549	50	34	48
Grand total	3801	4201	5814	20122	21568	31980	19	20	18

- Notes
- Cultural programs include arts magazine programs, ballet and dance, concerts and opera.
 - In addition to infomercials, examples of 'other information only' programs during the study period included Parliamentary question time, broadcast on Sky News Australia.
 - Examples of 'non-program material' during the study period included interstitials on Nickelodeon and filler programming on ESPN.
 - Examples of 'other programs' during the study period were programs that could not be easily classified to other categories.

Source Estimates based on OzTAM (2004; 2005)

Table 1.2 Proportions of local and foreign programming by subscription television channel, September 2003, June 2004 and July 2005 (per cent)

Channel	2003	2004	2005
Animal Planet		12	4
Arena	0	1	4
Arena +2			4
Cartoon Network	0	0	0
Channel V	99	96	100
CNBC Australia	1	1	0
Comedy Channel	13	7	4
Comedy Channel +2			4
Discovery	3	8	6
Disney Channel	1	5	6
E!			0
ESPN		0	2
FOX Classics	2	1	0
FOX Classics +2			0
FOX Footy	100	100	100
FOX Sports 1	33	34	50
FOX Sports 2	25	12	45
FOX8	3	1	2
FOX8 +2			2
Hallmark	34	45	32
History Channel	3	4	4
How to Channel			4
Lifestyle	26	33	29
Lifestyle +2			29
Lifestyle FOOD			13
max	33	98	96
Movie Extra	0	2	8
Movie Greats	2	0	1
Movie One	3	2	1
MTV	53	30	50
National Geographic	3	4	5
Nick Jr.			21
Nickelodeon	4	5	7
Showtime	6	4	6
Showtime 2			6
Showtime Greats	7	7	0
Sky News	66	64	65
TV1	0	0	1
TV1 +2			1
UKTV	3	3	0
UKTV +2			0
VH1			63
W	4	6	6
Grand total	19	20	18

Source Estimates based on OzTAM (2004; 2005)

1.4 Comparisons

Testing whether subscription television has definitely provided its customers with greater choice and diversity is difficult, as readily-available program diversity data is not necessarily directly comparable. Figure 1.4, however, is an attempt to do just this by averaging and extrapolating program diversity data published for commercial free-to-air broadcasters by the ABA for 2000 (the most recent year available) and the OzTAM data used in this thesis. Clearly, subscription television provides its viewers with access to more hours of programming over all genres, and more local content over most genres. These results suggest that the Australian subscription television industry has indeed delivered increased choice and diversity in programming and new opportunities for program producers.

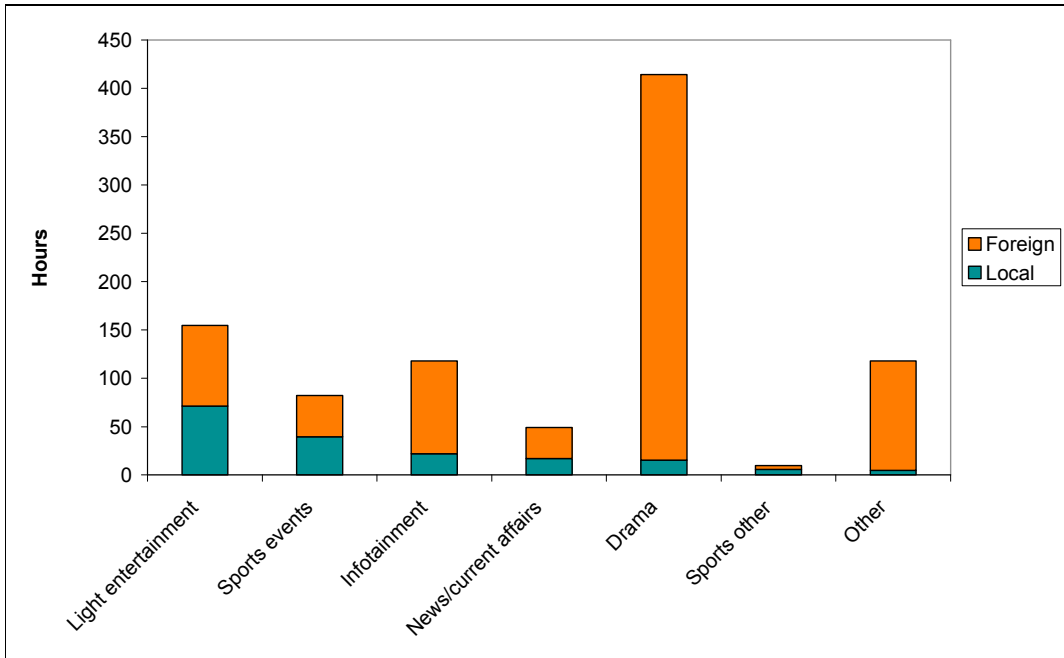
1.5 Summary

Between 2003 and 2005, local content made up to 20 per cent of total subscription television broadcast hours. Although these estimates of the average proportion of local content on subscription television appear stable, in terms of genre, channel and over time, proportions of local content may be highly variable. The genres with higher amounts of local programming in the study period were those that were either less expensive to produce relative to television drama and feature films, or were re-runs of programs made for free-to-air television. The lowest proportions of local content were for genres that are costly to produce.

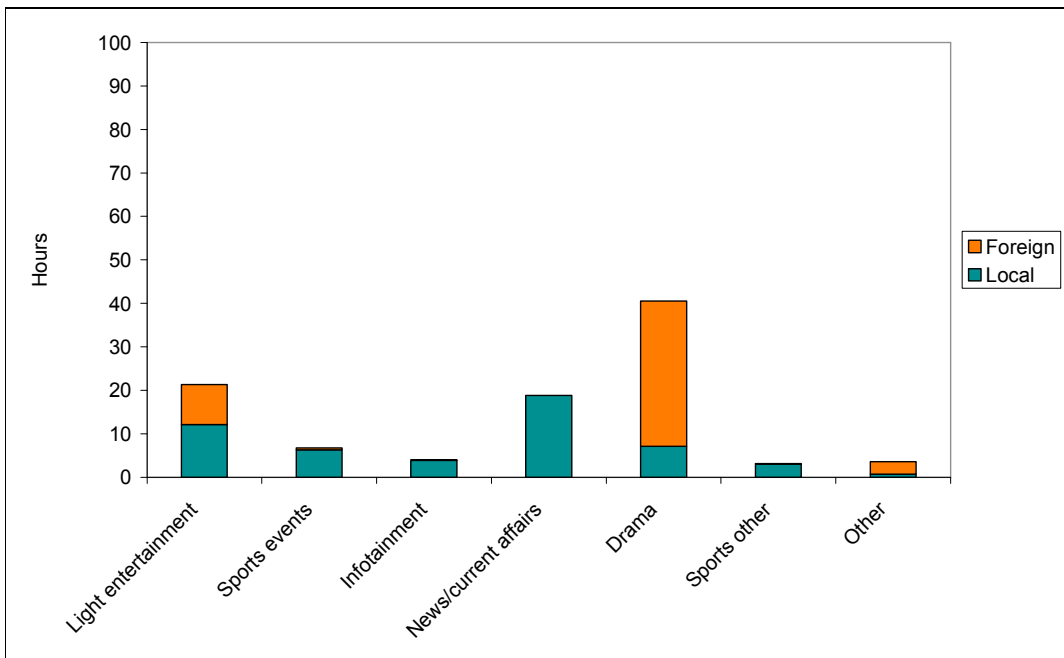
It is not possible to definitely state whether the introduction of new channels during the study period (using the increase in bandwidth yielded by the digitisation of the FOXTEL platform) has had a significant effect on overall local content levels. Most of the channels only available in the digital subscription packages are not yet included in the OzTAM ratings data. Many of those channels for which OzTAM data is available are established channels that have been time shifted. The local content proportions shown in Figure 1.3 suggest that new digital channels such as How To Channel may have relatively low levels of local content, however, the digital Nick Jr has more local content than the other children's channels.

Figure 1.4 Program diversity for an average 24 hours^{a,b}

Subscription television, midnight to midnight July 2005



Commercial free-to-air television, 5.00pm to midnight, 2000



- Note**
- a. Different Y axis scales are used here for commercial and free-to-air television services.
 - b. Genre groupings are based on the ABA groups. Other includes children's programs, reality television programs and specials.

Source Estimates based on ABA (2001) and OzTAM (2004; 2005)

2. Demand for subscription television programming

The policies that established subscription television industry in Australia were substantially supply led. The regulatory framework was influenced primarily by the television industry, as well as the bureaucrats and politicians responsible for drafting the BSA. Subsequent changes to legislation have also been influenced mainly by the industry and regulators. Little, if any, analysis has been undertaken outside the industry on demand for subscription television services and programming.

Publicly-available studies of demand for all types of broadcasting services are rare in Australia. During the 1980s and early 1990s, the then regulator, the Australian Broadcasting Tribunal, conducted regular studies of demand for broadcasting services. The *Broadcasting Services Act 1992* does not require this role of the Australian Communications and Media Authority (ACMA), nor did it of its predecessor, the Australian Broadcasting Authority. ACMA only conducts audience research in areas where it is required to by regulation – violence on television, for example.

Thus, although subscription television services commenced in Australia in 1995, there are no academic studies of its effect on television viewing or on the supply of programs to audiences. This analysis aims to address this by extending OzTAM ratings data to examine the types of programs that are offered to Australian audiences and what is watched. Of particular interest is the question whether a program's characteristics, including its country of production, have any significant effect on its ratings.

2.1 Method

This section uses OzTAM ratings data to explore the characteristics of audience demand for programs on Australian subscription television. The ideal way to examine demand for any product is by conducting extensive surveys of consumer preferences as well as the actual choices they make. Television viewing choices are already available as ratings data. Ratings data is a cost-effective way of examining demand, and as subscription television ratings information has been available in Australia only since 2003, is relatively unexplored.

Ratings can be compared for different parts of the Australian community, for different types of programs and for different channels. Regression analysis, as was undertaken by Anderson et al (1997), can be used to assess the relative importance of different factors, such as country of origin or genre or channel, in influencing the size of a program's audience.

Ratings data is not without limitations. Rather than providing a measure of what people would like to watch most of all, ratings measure how many people choose to watch a particular program given a set of choices. Aggregated ratings data, which was available to this study, also requires an assumption that all people with the same demographics have the same preferences. Nevertheless, ratings data is likely to reflect underlying ideal preferences to at least some extent:

Demand is proxied (imperfectly) by ratings and viewer share. Because there is no per program price for cable or off-air programming (only an opportunity cost for the

viewer), viewers make an all-or-nothing choice in this medium. Viewers' demand for US relative to Canadian programming, as given by ratings, approximates the value to carriers of charging viewers for US signals, and the relative loss to US rights holders who are compensated according to signal supply, rather than demand (Anderson, Swimmer, and Suen 1997)

2.2 Factors affecting program ratings

The size and type of audience that a television program attracts is influenced by a number of different factors, not all of which are captured by ratings data. Foremost, the characteristics of a television audience are determined by structural factors, including who is typically available to watch television at a given time during the day or week, or seasonal patterns that may influence the desirability of other leisure activities. Second, individual preferences come into play, including taste and needs, the effectiveness of program promotions and advertising and the dynamics of groups that may watch television together. Media factors also influence program ratings, including the availability of the television service and its content, the appeal of the service and its affordability and other technologies that may have achieved significant market penetration (Webster and Phalen 1996).

This and the following section examine separate characteristics or dimensions of the OzTAM ratings data acquired during the course of this project that may reflect factors that influence a program's eventual ratings. These include viewing patterns over time, during the day, by channel, of particular program genres and by audience age group and gender. The doctoral thesis on which this paper is based provides a detailed numerical and graphical descriptions of each characteristic. This section summarises the results of this analysis. The following section analyses the relative influence of these different characteristics on program ratings using generalised linear regression techniques.

For the sake of brevity, this and the following section focus on ratings reach and share data for households and individuals, to identify factors that appear to have a significant influence on a program's ratings share. Reach is the total number of households or individuals watching a particular program or channel. Share is the proportion of the total television viewing audience watching a specific program or channel. Household ratings data can provide a good overview of viewing patterns as most television viewing and program choice is done by groups. For example, parents watch *Playschool* with their young children, and children watch movies and news programs with other household members (Webster, Phalen, and Lichty 2000). Household ratings data, however, can also be more difficult to interpret than data for individuals, as some variation in the data is lost through averaging.

2.2.1 Viewing over the study period

Average reach data for subscription television programs decreased during the study period. This decrease is counter to an overall increase in total subscription television reach during the study period, suggesting that the increase in the number of channels available on Australian subscription television services during the study period and the associated increase in viewing choices have resulted in a larger audience being spread more thinly across programs.

2.2.2 Viewing during the day

Subscription television does not experience as strong an increase in viewing during ‘traditional’ prime-time periods as free-to-air television. Nevertheless, the ratings data acquired for this project shows a clear increase in average reach for individuals through the day, peaking at around 8.00pm. Average individual share peaks in the middle of the day, as subscription television captures a higher proportion of day-time viewers than other television services.

2.2.3 Viewing by channel

Plotting household program ratings data by channel for July 2005 shows that, although the highest-rating subscription television programs were rugby league games on the Fox Sports channels, they were not, on average, the highest rating channels. Instead, in July 2005, the channels with the highest average household shares were TV1, FOX8, LifeStyle Channel, Disney Channel and UKTV.

The tiering of channels in subscription packages appears to affect viewer numbers. Channels on basic subscription tiers tend to attract higher viewing audiences than channels on higher tiers, including, the movie channels and many of the new digital channels. For example, the Movie Network channels, which are available on FOXTEL only on its highest ‘platinum’ tier, rate lower than the Showtime channels. This effect is predictable, as higher-tier channels are purchased by only a proportion of all subscribers.

2.2.4 Viewing of particular genres

Looking at program shares by genre also shows that the highest rating programs on subscription television in July 2004 were sports events. On average, however, the programs with the highest household shares were specials (for example, the announcement of the Olympic host city for 2012 on Sky News Australia), comedy (*The Simpsons* on FOX8 and *Birds of Feather* on UKTV), drama (*Law & Order: SVU* and *Law & Order: Criminal Intent* on TV1) and children’s programs (*That’s so Raven*, *Disney’s Lilo and Stitch* and *Recess* on the Disney Channel). Although the model used by Anderson, Swimmer and Suen (1997) combines country of origin and genre categories, their findings also suggest that comedy and drama programs are also popular genres in Canada.

2.2.5 Viewing of programs from particular countries

In July 2005, average ratings for locally-produced programs did not differ markedly to those from the UK and USA. The programs attracting the highest ratings estimates, however, tended to be those that were produced locally. In terms of average ratings for individuals, in July 2005, local programs tended to out-rate foreign content on subscription television by a small amount: the overall average individual reach for Australian programs was 10,000 compared with 9,000 for programs from overseas. There is a substantial overlap between the most popular Australian and foreign programs. This suggests that for some program types, at least, country of origin is not as important a factor in viewers choosing to watch the program as genre. Overall, the

programs with the highest ratings reach and shares on subscription television during this period were local rugby league games.

2.3 Regression analysis

Although plots of ratings data against program characteristics do provide some insights into the demand for different types of television program, they do not indicate how a particular characteristic may influence demand relative to other characteristics. Statistical regression techniques can be used to test whether there is a numerical relationship between a program's audience size and share and its characteristics, and how important different characteristics are relative to each other in affecting demand. Thus, it is possible to identify those variables that are most likely to determine a program's popularity.

2.3.1 Analytical approach

I have used generalised linear regression to test whether program characteristics significantly influence a program's reach and share: Looking at reach should provide information about what types of programming attract large and small audience numbers. Looking at share alone allows a focus on only those viewers who have chosen to watch television – hence, the decision to watch television does not need to be taken into account in the analysis.

Unlike linear modelling techniques that are based on ordinary least squares and assume that data are distributed according to a normal distribution, generalised linear models allow for modelling where responses are distributed as one of the members of the exponential family rather than as a normal distribution. Generalised linear modelling is appropriate for data that includes binary data (zero or one), Poisson responses (count data including the ratings reach data used here) or exponential responses (for example, time to failure) (Myers and Montgomery 1997). Generally, logistic regression is used where the dependent variable is binary, that is, has a value of either zero or one. A logistic model fits an S-shaped curve that gradually approaches its limits of zero and one.² Logistic regression can also be used where the dependent variable is a proportion or is limited to a range of between zero and one.

² Logistic regression takes the log odds as the dependent variable which is modelled against the independent variables. The equation that is modelled is of the form:

$$\log\left(\frac{p}{1-p}\right) = \text{logit}(p) = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k$$

where p = the dependent variable, which is no less than zero and no greater than one;

x_i = is the i th independent variable:

β_i = is the coefficient corresponding to the i th independent variable. β_0 is the constant, or intercept, term.

Interpreting the modelled parameters is easier if the model is expressed as:

$$p = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + \dots + \beta_k x_k)}}$$

Logistic slope coefficients can be interpreted as the effect of a unit of change in the X variable on the predicted logits with the other variables in the model held constant. That is, how a one unit change in X affects the log of the odds when the other variables in the model held constant.

Categorical variables, such as a program's genre or country of origin, can be included in a regression model as factors. Each possible level of a factor is allocated a value of zero or one. If, for example, the factor is colour, then the levels might be red, white and blue. For the colour blue, red and white would be set to zero, and blue would be set to one. It is not necessary to allocate 0s and 1s to every factor level – in this example, as the observation is neither red nor white, it must be blue. Statistics packages thus use one level as a constraint, effectively setting it to zero, and calculates coefficients for the remaining levels. The parameter estimates for factors are just as much a function of the contrast settings as the underlying data. They are best interpreted in relation to each other and the intercept estimates, rather than as absolute and independent numbers.

2.3.2 Selecting the model

In order to identify regression models that provided a reasonable explanation of variation within the ratings data sets, I tested six different model specifications that included the factors discussed in this and the previous chapter (Table 2.1). The models rest on two assumptions:

- all viewers with the same demographic characteristics have the same preferences; and
- all programs with the same characteristics have similar appeal.

To include the effect of an individual's or a household's preferences on a program's audience, individual-level, rather than aggregated, ratings data would be required.

Models 1, 2, 3 and 4 use the simpler, upper-level OzTAM program categories. Models 5 and 6 use the more detailed categories. As would be expected, the more detailed categorisation accounts for more variation in the data than the simpler scheme. The large number of categories in the more detailed system was so great that it was not possible to fit the model that contained an interaction between typology and country (model 7). Model 7 would likely have been the model of best fit, however, the small difference between the residual deviances for models 3 (no interaction term) and 4 (with interaction) suggests that any further reduction in the residual deviance may only have been small. Although there were ample degrees of freedom to fit model 7 to the data, processing it was beyond the capabilities of my Pentium 4 / 512MB RAM computer.

Models 3, 4 and 6 transform the Start Hour variable to its square root. A program's reach follows an approximate parabola when plotted against its start time.

Transforming the variable in this way improves the fit of the model somewhat, as evidenced by the difference in the residual deviances of models 1 and 3. (Other transformation functions, including logarithms and squares, did not result in similar improvements in fit.)

I also calculated coefficient correlation tables to determine whether the independent variables were correlated in any way. The correlation estimates suggested there were no significant correlations within the data variables.

Table 2.1 Alternative regression specifications and deviances, reach of households watching subscription television programs, July 2005

No.	Model structure
1	Dependent variable ~ StartHr + Duration + Day + Channel + Genre.1 + Country
2	Dependent variable ~ StartHr + Duration + Day + Channel + Genre.1 x Country
3	Dependent variable ~ sqrt(StartHr) + Duration + Day + Channel + Genre.1 + Country
4	Dependent variable ~ sqrt(StartHr) + Duration + Day + Channel + Genre.1 x Country
5	Dependent variable ~ StartHr + Duration + Day + Channel + Genre.2 + Country
6	Dependent variable ~ sqrt(StartHr) + Duration + Day + Channel + Genre.2 + Country
7	Dependent variable ~ sqrt(StartHr) + Duration + Day + Channel + Genre.2 x Country

Note Rather than expressing each model in terms of log odds, a short hand expression is used here where the dependent variable is either reach or share ($P = \text{logit}(p)$). 'x' indicates an interaction term. Duration is program duration measured in hours, Genre.1 and Genre.2 are the different levels of OzTAM program typology categories outlined in Appendix A.

Table 2.2 and Table 2.3 summarise the results of fitting a Poisson regression to the household reach data and a logistic regression to the household share data for each of the six model structures. The relative goodness-of-fit can be assessed by comparing the residual deviances the null deviance for each regression type. A measure similar to the r^2 used in ordinary least squares regression (but with nowhere near its statistical robustness) can be calculated by dividing the residual deviance by the null deviance. I have included this approximation of r^2 to allow for a straightforward comparison of the relative fit of different models, however, it is best just to compare the residual deviances of different models in order to assess fit.

Table 2.2 Results of fitting a Poisson regression model to reach of households watching subscription television programs, July 2005

Model no.	Degrees of freedom	Null deviance	Residual degrees of freedom	Residual deviance	'R²'
1	41198	349675	41128	177799	0.49
2	41198	349675	41072	172143	0.51
3	41198	349675	41128	170671	0.51
4	41198	349675	41072	165219	0.53
5	41198	349675	41027	163376	0.53
6	41198	349675	41027	156960	0.55
7	41198	349675	n.a.	n.a.	n.a.

Source Estimates based on OzTAM (2005)

Table 2.3 Results of fitting a logistic regression model to share of households watching subscription television programs, July 2005

<i>Model no.</i>	<i>Degrees of freedom</i>	<i>Null deviance</i>	<i>Residual degrees of freedom</i>	<i>Residual deviance</i>	<i>'R²'</i>
1	41198	588	41128	366	0.38
2	41198	588	41072	360	0.39
3	41198	588	41128	367	0.38
4	41198	588	41072	362	0.38
5	41198	588	41027	345	0.41
6	41198	588	41027	347	0.41
7	41198	588	n.a.	n.a.	n.a.

Source Estimates based on OzTAM (2005)

Model 6 and model 5 respectively provide the best fits for the household reach and share data. Model 6 accounts for more than half of the variance of the household reach data, and model 5 accounts for something less than half of the variation in the share data. The only difference between the two models is the transformation of the Start Hour variable, suggesting that household share does not increase during prime time to the same extent as reach. Unexplained variance could be accounted for by a number of variables for which data was not available for this analysis, including structural factors such as availability to view and competing programming, and individual preferences including the attractiveness of programming (Webster, Phalen, and Lichty 2000). Quality and budget are important determinants of a program's attractiveness to an audience (Sedgwick and Pokorny 1999).

It is important to note that the data represents all programs on all channels for which July 2005 ratings data was available – the sample is not random and can be considered a census of available data for the selected time period. If the sample is accepted as a census, testing the statistical significance of the fit of each is not necessary. If the data is considered to be a sample of 2005 ratings, confidence interval estimates would be difficult to calculate as the sample has not been randomly selected. The data is thus best treated as a census of available data, although this is not ideal from a statistical perspective. It should be borne in mind that the data set omits channels that do not subscribe to the OzTAM ratings service, and viewers that watch subscription television from commercial premises.

As well as looking at residual deviances to assess the fit of each model, I calculated how much deviance in the data could be accounted for by each variable. The following section includes analysis of deviance tables for the models of best fit for different demographic groups. The results summarised in the following section show that, in July 2005, of all of the characteristics included in the regression models, the channel on which a program was shown had the most significant effect on its eventual reach and share.³ The next most significant determinants of audience size were the time at which a program started and its genre. The other variables included in the models, including country of origin, explained only a very small amount of variation in the data.

³ The influence of the channel a program is shown on may be distorted by the 'double jeopardy' effect, which suggests that viewers of popular channels tend to be more loyal, and viewers of lower-rating channels tend to be disloyal or irregular viewers (Barwise and Ehrenberg 1988; Webster, Phalen, and Lichty 2000).

2.3.3 Interpreting the results

The full list of parameters and their values for each model is lengthy and are not included in this paper. Instead, analysis of deviance tables are presented to show the explanatory power of parameter estimates for each model for households and individuals.

Households

As stated above, the characteristic that most influences a subscription television program's household ratings is the channel on which it is broadcast. Channel accounts for more deviance in the household reach and share data than any other variable included in this analysis (Table 2.4 and Table 2.5). The channels with programs most likely to have high household reach in July 2005 were TV1, FOX8, the LifeStyle Channel, and UKTV, in that order. The channels attracting high average shares were similar: TV1, Sky News Australia,⁴ FOX8 and LifeStyle Channel. CNBC Australia was the channel least likely to attract a large audience.

A program's start time has the next most important effect on its eventual household audience reach, although it does not appear to have a significant influence on share. As more people are available to view television, a program's reach will typically increase. Share, on the other hand, is less likely to be influenced by structural factors such as audience availability. Thus, programs broadcast later in the day and evening are more likely to achieve higher household reach than programs broadcast at other times.

Genre makes a small contribution to explaining variation in household reach and share ratings. Although its effect is not significant compared with channel and start time, it is possible to identify which genres are more likely to attract higher household ratings. Genres with higher household reach appear to be those that have a broad appeal across individuals within a household – for example, a household with children is more likely to watch G-classified programs than those classified MA. In July 2005, the sub-genres attracting higher reach results were specials, sport movies, cricket coverage and rugby league games. Sub-genres attracting higher shares were children's game shows, specials, and adult movies.^{5,6} Sub-genres least likely to attract a large household audience were short films, surfing coverage and health and medical infotainment programs.

Country of origin only accounts for a tiny proportion of the variation in the household share data. In July 2005, programs from the US were slightly more likely to attract higher household shares than Australian programs. Australian programs attract higher shares than programs for Canada, Europe, New Zealand and the United Kingdom. It must be emphasised that these effects are not very significant in magnitude.

⁴ The relative popularity of Sky News Australia in July 2005 may have been driven by interest in news programming following the London terrorist bombings.

⁵ *Camp Orange* and *Islandares* on Nickelodeon were the only children's gameshows broadcast on subscription television during July 2005.

⁶ The popularity of specials during the study period was due to interest in the announcement of the venue of the 2012 Olympics and coverage of the launch of the space shuttle.

Table 2.4 Analysis of deviance, model 6, reach of households watching subscription television programs, July 2005

	<i>Degrees of freedom</i>	<i>Deviance</i>	<i>Residual degrees of freedom</i>	<i>Residual deviance</i>	<i>'R²'</i>
Null			41198	349,675	
Square root of start hour	1	53,421	41197	296,254	
Duration	1	1,074	41196	295,180	
Day of week	6	1,478	41190	293,701	
Channel	40	118,815	41150	174,885	
Sub-genre	115	17,107	41035	157,778	
Country	8	817	41027	156,960	0.55

Source Estimates based on OzTAM (2005)

Table 2.5 Analysis of deviance, model 5, share of households watching subscription television programs, July 2005

	<i>Degrees of freedom</i>	<i>Deviance</i>	<i>Residual degrees of freedom</i>	<i>Residual deviance</i>	<i>'R²'</i>
Null			41198	588.3	
Start Hour	1	1.9	41197	586.4	
Duration	1	1.1	41196	585.2	
Day of week	6	0.7	41190	584.4	
Channel	40	213.0	41150	371.3	
Sub-genre	115	24.0	41035	347.2	
Country	8	1.5	41027	345.7	0.41

Source Estimates based on OzTAM (2005)

Individuals

Like households, the most important determinant of a program's individual reach and share is the channel on which the program is broadcast (Table 2.6 and Table 2.7). Start time affects reach, and a program's genre affects both its reach and share, although to a lesser extent than channel.

The subscription television channels achieving highest average individual reach in July 2005 included, in order, TV1, FOX8, LifeStyle Channel and UKTV. Channels with highest average individual share were TV1, FOX8, Sky News Australia and Lifestyle Channel. The least watched channel in the dataset was, on average, CNBC Australia.⁷ Genres most likely to attract both higher individual reach and share in July 2005 included specials, cricket and rugby league coverage and children's game shows. Sub-genres with lower average individual ratings included short films and surfing coverage.

⁷ It is worth noting that is highly unlikely that CNBC Australia is the least watched subscription television channel in Australia. Channels with small audiences are less likely to subscribe to the OzTAM ratings service, and therefore ratings data is not available for them. Also, CNBC Australia is distributed to commercial premises, which means that its true audience is larger than that estimated by OzTAM.

Table 2.6 Analysis of deviance, model 6, reach of individuals watching subscription television programs, July 2005

	<i>Degrees of freedom</i>	<i>Deviance</i>	<i>Residual degrees of freedom</i>	<i>Residual deviance</i>	<i>'R²'</i>
Null			41,198	563,864	
Square root of start hour	1	93,964	41,197	469,900	
Duration	1	891	41,196	469,009	
Day of week	6	3,572	41,190	465,436	
Channel	40	176,719	41,150	288,718	
Sub-genre	115	26,055	41,035	262,662	
Country	8	1,373	41,027	261,288	0.54

Source Estimates based on OzTAM (2005)

Table 2.7 Analysis of deviance, model 5, share of individuals watching subscription television programs, July 2005

	<i>Degrees of freedom</i>	<i>Deviance</i>	<i>Residual degrees of freedom</i>	<i>Residual deviance</i>	<i>'R²'</i>
Null			41,198	646.0	
Start Hour	1	3.4	41,197	642.5	
Duration	1	0.1	41,196	642.3	
Day of week	6	0.8	41,190	641.5	
Channel	40	209.5	41,150	431.9	
Sub-genre	115	24.3	41,035	407.6	
Country	8	1.5	41,027	406.0	0.37

Source Estimates based on OzTAM (2005)

2.4 Summary

The analysis in this section reveals several trends in demand for subscription television services and programs broadcast on subscription television. Additional results that follow from the more detailed analysis of my doctoral thesis include:

- Viewing of subscription television services increased significantly between June 2004 and July 2005, with average program ratings share for households increasing by 435 per cent for individuals and by 161 per cent for households. This may reflect increased take up of subscription television during this period and perhaps more appealing viewing choices compared to free-to-air television following digitisation.
- Subscription television services experience the prime time peak enjoyed by free-to-air services, but its audience growth occurs throughout the day, rather than being focussed in the late afternoon or early evening.
- The most popular programs on subscription television during the study period were local sports events. During the sampled period, cricket and rugby league were the most-watched sports.
- Although the most-watched programs on subscription television are sports programs, the most popular channels are general entertainment channels. In July 2005, the channels with the highest average household shares were TV1, FOX8, LifeStyle Channel, Disney Channel and UKTV.

- Bundling of channels into tiers appears to affect viewer numbers, with channels on basic subscription tiers tending to attract higher viewing audiences than channels on higher tiers.
- Although, on average, foreign programs on subscription television tended to achieve higher ratings than local content, locally-produced content is more popular than imports for a range of popular genres including children's drama, pre-school programs, sketch comedy programs, infotainment / lifestyle programs, game shows, news and current affairs programs, reality television programs and sports events.
- Reach and share for different age groups appear to have an inverse relationship: although the total number of young viewers watching subscription television is lower than the total number of older viewers, subscription television captures a higher proportion of those younger viewers watching television.
- Although average viewing of programs on subscription television is almost identical for men and women, maximum values of reach and share for men are significantly higher than for women, suggested that demand for popular programs among men is more intense than for popular programs among women.

Fitting generalised linear regression models to the July 2005 ratings data revealed further information:

- The channel a program is broadcast on probably has the most significant influence on the size of the audience it attracts. Despite the plethora of channels on subscription television, viewing across demographic groups tends to be concentrated on a handful of channels: FOX8, TV1, Arena TV, LifeStyle Channel and the local sports channels. Younger audiences, however, are also likely to watch channels directed at their age groups, that is, the children's channels and the music channels.
- A program's start time has the next most significant influence on its ratings reach, but not on its share. Start time is not particularly important, however, for explaining the viewing of 0 to 4 year olds, who are more likely to watch during the day than older children or adults.
- Genre is the third significant influence on reach and share, although it is not as important in explaining variation in viewing patterns as channel. This suggests that viewers seek out programs that they are interested in watching, although they do tend to gravitate to the same handful of channels.
- Different types of individuals in households appear to influence each other's viewing patterns. This is evidenced by the popularity of some children's programs in adult age groups, and the high proportions of young children watching sports programs.
- A program's country of origin is not a significant variable in explaining variation in viewing patterns.

It does appear, therefore, that there is a significant audience for locally-produced programming broadcast on subscription television in Australia. Audiences for local programs are not, on average, particularly different to those for imported programs, and in many cases local productions out-rate similar productions from overseas. For example, locally-produced news and sports programs out-rate similar imports, while Australian productions were identified in the top five children's programs, documentaries, lifestyle and infotainment programs and light entertainment programs.

Of course, local programming must first be supplied to audiences in order for it to attract a following, however, interest in local content on subscription television appears to assured, especially if it is well publicised, and it is broadcast on a channel that viewers are likely to watch.

This analysis omits many program characteristics and audience factors. Some characteristics identified as potentially useful for explaining deviance in the ratings data could not be incorporated in the analysis. These included whether the program was a first or subsequent release and whether the program had been promoted and to what extent. A possible variation on examining a program's rating results for a particular program could usefully be made by looking at its cumulative ratings over a period of time.

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