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# **The Extent and Measurement of VCR Time Shifting**

*A thesis presented in partial fulfilment  
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## ABSTRACT

The validity and accuracy of television programme ratings are critical to media planners and broadcasters alike. Media planners use ratings to select programmes that will satisfy certain reach and frequency objectives, which in turn contribute to an advertising campaign's overall goals. Broadcasters deliver audiences to advertisers, and base programme scheduling and pricing decisions on ratings data.

At present, ratings are delivered within 24 hours of viewing and do not include adjustments for time shift viewing. Time shifting occurs when a television programme is videotaped and replayed at a later date. Given that VCR penetration in New Zealand has increased to over 75 percent of households, it is clear that programme ratings may be higher than the current overnight ratings suggest.

This thesis explored the extent and measurement of time shifting in New Zealand. More specifically, it used AGB McNair's people meter data to examine: the scale of time shifting, the current methods of measuring time shifting, and future methods of estimating time shift viewing. The study aimed to identify whether patterns of time shifting behaviour exist, and whether these patterns could be used to model more inclusive overnight ratings.

The findings suggest that, although the overall effect of time shifting on programme ratings is small, some programmes have very high levels of time shift viewing, prompting the need to include time shift viewing in the overnight ratings. The main constraint impeding the inclusion of VCR ratings in the overnight ratings is the difficulty in estimating time shift audiences overnight.

This study proposed a number of methods of estimating VCR ratings overnight, including the recording level adjustment method, the same day playback adjustment method, and the genre/station correction method. While further research is required to

compare the predictive ability of the methods, in the meantime implementing any of the methods is likely to provide more accurate overnight estimates of total audiences.



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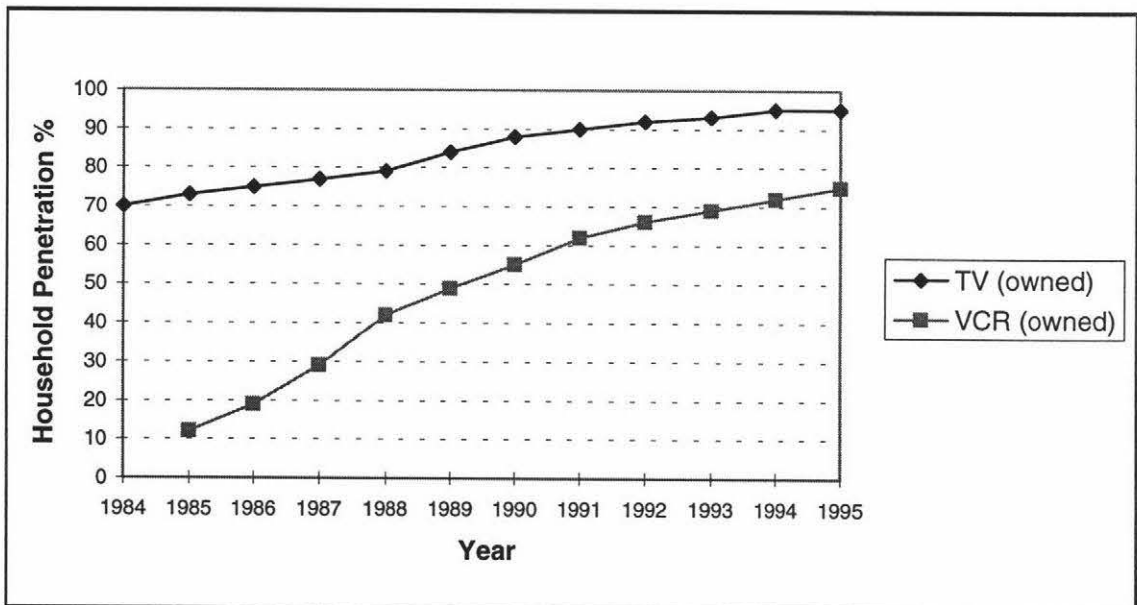
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## CHAPTER 1. INTRODUCTION

### 1.1 VCR Penetration

New Zealanders have been quick to adopt many new technologies, among them video cassette recorders, or VCRs. Current data suggests that over 75 percent of New Zealand households own a VCR and this is expected to continue slowly rising until nearly all homes with a television also have a VCR (see figure 1). Many households are also acquiring additional VCRs, corresponding with the increase in the number of television sets per home.

**Figure 1. Penetration of the VCR and colour television in New Zealand**



Source: Department of Statistics. NZ household expenditure and income survey section.

Compared to other countries, New Zealand has one of the highest levels of VCR penetration in the world (see table 1). The United States has had the fastest adoption rate of VCRs, as it has with many other media products, such as televisions. VCR

penetration and viewing trends in New Zealand have generally followed trends of the United States.

**Table 1. Household VCR penetration by country**

Country	Household VCR penetration %
United States	81
United Kingdom	76
New Zealand	75
Japan	74
Irish Republic	73
Sweden	72
Netherlands*	68
France	66
Germany	63
Finland	63

Source: Robbins (1996) and New Zealand Department of Statistics  
All data 1995 except \* 1994

The high level of VCR penetration in New Zealand, almost certainly affects television viewing. This study examines the effect of VCR time shifting on programme audiences, an issue which is of importance to broadcasters and media planners alike.

## **1.2 VCR Time Shifting**

VCRs facilitate more flexible television viewing since they allow programmes to be taped, stored and viewed at some future time. This behaviour, known as time shifting, permits viewers to rearrange the programme schedule devised by broadcasters to suit their own lifestyle and to avoid conflicts in programme scheduling. Viewers' enhanced ability to control the time at which they view particular programmes means that more viewers may be watching television programmes.



VCR time shifting may increase individual's television viewing levels in three ways: some programmes which might otherwise be missed due to competing activities can be saved on tape; viewers are able to watch two different programmes even though they are broadcast simultaneously; and repeat viewing of the same tape is possible (Levy, 1980; Levy, 1981; Kirkham, 1982). To support the claimed increase in television viewing, Levy (1981) stated that his findings *"strongly suggest that the earliest adopters of home video cassette recorders use their VCRs as a complement to, and not as a replacement for, established patterns of broadcast exposure"* (p.405).

Some researchers disagree that time shift viewing increases viewing levels and instead claim that time shift viewing appears to substitute normal live viewing hours. For example, Darkow (1984) found that *"the time that people with access to a video machine spend in looking at television programmes is the same as that spent by people without videos, although about 16% is time-shifted"* (p. 29).

Whether time shifting increases total audiences or not is a difficult issue to quantify. It is known, however, that time shift viewing contributes additional viewers to the live audiences of programmes. Therefore, the current system of audience measurement, which delivers overnight ratings, may underestimate real programme audiences.

### **1.3 Time Shifting and Programme Ratings**

The validity and accuracy of television programme ratings are critical to media planners and broadcasters alike. Media planners use ratings to select programmes that will satisfy certain reach and frequency objectives which, in turn, contribute to an advertising campaign's overall goals. Broadcasters deliver audiences to advertisers, and base programme scheduling and pricing decisions on ratings data.

Television ratings are assumed to provide a measure of the total audience to a broadcast programme; arguably, ratings should, therefore, include both live and time shifted viewing. At present, New Zealand's overnight ratings, collected by AGB McNair, do not include adjustments for time shifted viewing<sup>1</sup>. AGB McNair do, however, measure VCR recording and playback, although this behaviour is not incorporated in programme ratings for a number of reasons.

The first reason is that the overall effect of time shifting on programme ratings has not yet been clearly established. While some figures suggest that playback constitutes only 2.8 percent of each individual's total viewing hours (Robbins, 1996), other studies have suggested that, for some programmes, time shift viewing may account for a quarter of all household viewing (Mojo, 1994). Until the likely size and composition of time shift audiences is more precisely documented, there seems little point in enhancing the software which calculates ratings.

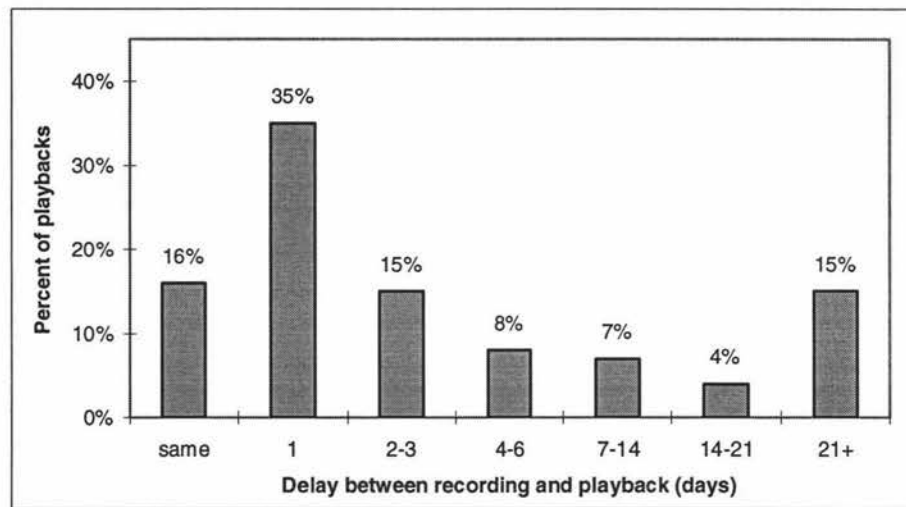
The second reason is that ratings are provided overnight, whereas playback of time shifted programmes from the time of taping is usually greater than one day (see Figure 2). To overcome this problem, two sets of data could be released: live ratings within 24 hours, and, after a given period of time, live ratings augmented by VCR playback<sup>2</sup>. However, media planners and advertisers often need to make decisions from day to day and viewing data a week or more old may be of little assistance. Alternatively, if stable patterns in time shifting behaviour exist, it may be possible to develop factors which could be used to adjust the overnight ratings and thereby model the likely final audience of programmes.

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1. A.C. Nielsen, an American rating service, has included *VCR recordings* in its ratings since 1978 (Goodman, 1996, email). However, this method overstates the size of the broadcast audience, since some recordings are not played back until after the ratings period, and some recordings are never played back.

2. TN AGB, the ratings service in the United Kingdom, uses this method, in fact, most of the ratings data that they publish include time shift viewing which takes place within 7 days of recording (Taylor, 1996, email).

**Figure 2. Viewing lag of time shifted programmes (July 1991)**



Source: AGB McNair

A third constraint associated with incorporating VCR playback in the television ratings is the controversy over the effect of time shifting on commercials, which is outlined in more detailed below.

## 1.4 Time Shifted Commercials

Television advertisers are concerned that the inclusion of time shifting in the ratings could result in double jeopardy: they may have to pay more for time slots, yet their advertisements would almost certainly be prone to commercial avoidance behaviours, such as 'zipping' or 'zapping' or to time shift delay.

Zippering occurs when viewers fast-forward commercial breaks during VCR playback. *"At best, zipped advertising will have no audio material, lower visual quality, and faster information flow"* (Abernethy and Rotfeld, 1991, p.14). Zapping involves deleting advertisements during the recording process<sup>3</sup>.

3. In television research literature, zapping also refers to changing channels to avoid advertisements.

Researchers have tried to estimate the extent of zipping; Cronin and Menelly (1992) found that six out of ten commercials were completely or partially zipped. A study by Nielsen in 1988 found that between 60 and 80 percent of commercial minutes are zipped during playback (Gilmore, Secunda, and Warrens, 1991). Other studies in the late 1980s found rates of commercial avoidance via zipping ranging from 50 to 65 percent of VCR persons (Yorke and Kitchen, 1985; Metzger, 1986) or VCR playbacks (Kaplan, 1985a; Papazian, 1986; Reiss, 1986). These results suggest that time shifted commercials are more likely to be zipped than viewed.

However, zipped advertisements are not completely worthless, for a number of reasons. Firstly, Gilmore and Secunda (1993) argued that *"zipped commercials can produce retrieval and reinforcement of previously learned information. Consequently, zipped commercials can function effectively as reminder ads"* (p.28) (also supported by Metzger, 1986; Reiss, 1986; Johnson, 1988; Gilmore, Secunda, & Warrens, 1991). Secondly, zippers may stop fast-forwarding to view a commercial; *"18% of zippers named at least one TV commercial that caused them to stop fast-forwarding and watch the commercial"* (Reiss, 1986, p.3). Thirdly, advertisers can restrict the effects of zipping by having a stationary shot of the brand, for an extended period of time, on the television screen (Stout & Burda, 1989). The underlying idea is that if a stationary picture emerges on the screen from a mass of rapidly moving pictures, there is more opportunity to notice the product.

Zapping of commercials appears to be increasing but is still less prevalent than zipping. Metzger (1986) reported that only one percent of viewers zapped while recording. Ten years later, a Nielsen survey found that 25 percent of VCR owners omit the commercials when recording programmes (McDonald, 1996). Even though there is no opportunity for time shift viewers to see advertisements that are zapped during recording, the people who delete the commercials may actually be the most attentive advertisement viewers, as zappers have to watch the commercials with extra concentration in order to start the VCR after the commercial break (Metzger, 1986; Singer, 1986).

The delay of commercials due to time shifting is also a concern for advertisers, as some commercials may not be effective after a period of time. As an extreme example, an advertisement for an acclaimed musician's last concert will not be very effective when the time shifter sees it the day after the concert.

Given the avoidance issues related with time shifted commercials, the rating services ideally would be able to measure how many people see advertisements during time shifted programmes. However, commercial avoidance has long been a problem for live viewing also; *"The impact of people leaving the room during commercials and of people using remote controls to switch channels during commercial breaks, is far greater than zapping and zipping that's done with VCRs"* (Singer, 1986, p.67). This wider issue of commercial avoidance behaviour remains a highly contentious topic as far as live viewing is concerned and this debate would inevitably extend to attempts to include VCR playback in the ratings.

## 1.5 Summary

Time shifting occurs when a television programme is videotaped and replayed at a later date. Given that VCR penetration in New Zealand has increased to over 75 percent of households, it is clear that programme audiences may be higher than the current overnight ratings suggest. It seems that the two issues impeding the inclusion of time shift viewing in the ratings are the lack of thorough knowledge of the effect of time shifting on programme ratings, and the time shift viewing lag which makes it impossible to include real time shift data in the overnight ratings. Before addressing each of these issues in the objectives of this research, it is logical to examine the research literature, to ascertain whether any clear patterns in time shifting behaviour have yet been established. Chapter two investigates the extent of time shifting and factors that influence time shift levels. Chapter three examines previous literature relating to the measurement of time shift viewing. The objectives of this study and the research process undertaken to

address the objectives are detailed in chapter four. The results are presented and discussed in chapters five to seven, followed by the conclusions which are contained in chapter eight.

## **CHAPTER 2. THE EXTENT OF TIME SHIFTING AND INFLUENCING FACTORS**

The New Zealand rating service does not include VCR ratings<sup>1</sup> in the overnight ratings in the belief that the extent of time shift viewing is minimal. To estimate the effect of time shifting on programme audiences, researchers have studied the extent of time shifting and whether certain factors influence time shift viewing levels. The extent of time shift viewing has been quantified by investigating the use of VCRs for pre-recorded versus time shifted material and by comparing time shift audiences to live programme audiences. Variations in time shift viewing levels have been examined across programme genres, stations, times of the day, days of the week, and across demographic variables. The remainder of this chapter summarises and discusses the findings that have emerged to date.

### **2.1 VCR Use: Time Shift Viewing versus Pre-recorded Viewing**

Researchers have compared the extent to which viewers use their VCRs to play home recorded or pre-recorded<sup>2</sup> material. In the early 1980's, VCRs were predominantly used to play home recorded material; however, there is increasing evidence that viewers now play a greater proportion of pre-recorded material (Levy, 1980; Levy, 1981; Kirkham, 1982; Stoessl, 1982; Fiddick, 1984; Darkow, 1984; Metzger, 1986; Sims, 1989; Warrens and Thompson, 1992; Mojo, 1994; Jones, 1996). This trend is causing concern to broadcasters and advertisers alike, as pre-recorded tapes contain no advertising and detract viewers from live broadcast audiences, and therefore programme and commercial audiences<sup>3</sup> may be diminishing.

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1. VCR ratings represent an estimate of the proportion of the population who view a programme via time shifting.

2. Pre-recorded tapes are those which are not recorded on household VCRs. For example, this may include rented tapes, or pre-recorded tapes purchased from shops.

3. Due to this concern, advertisers are beginning to advertise on pre-recorded tapes.

Studies in the early 1980s indicate that viewers used VCRs to play more home recorded tapes rather than pre-recorded material (Levy, 1980; Levy, 1981; Kirkham, 1982; Stoessl, 1982; Darkow, 1984). Levy (1980) found that, on the average day, 3.8 percent of American households played home recordings and only 0.6 percent played pre-recorded tapes. In a more comprehensive study, based on the same data but a different measure, Levy (1981) reported that, on average, households played 3.4 home-made tapes compared to only 0.5 pre-recorded tapes per day. Similarly, Kirkham (1982) found that 36 minutes were spent on pre-recorded viewing per week, compared to three hours and 44 minutes on home recorded viewing. It is unclear from Kirkham's (1982) article whether he based his results on all households, VCR households only, individuals, or some other measure. Darkow's (1984) study found that of all VCR tapes played by 850 German households in May and October 1993, 25 percent were pre-recorded and 75 percent were home recorded.

In the mid-eighties, studies began reporting that pre-recorded viewing was rapidly increasing (Fiddick, 1984; Kitchen and Yorke, 1985; Metzger, 1986). In 1984, an AGB study found that in the United Kingdom, VCR homes spent 2½ hours per week viewing pre-recorded material, and 3½ hours viewing home recordings (Fiddick, 1984). Metzger (1986) estimated, that of VCR tapes watched, 50 percent were home recorded and 49 percent were either pre-recorded or were home movies made with a video camera; he did not state the classification of the remaining one percent of tapes.

By the late eighties, American viewers were playing a greater proportion of pre-recorded material than home recorded programmes. A study by Sims (1989), based on AGB data, found that households played three hours and 12 minutes of pre-recorded material per week compared to only one hour of home recordings per week<sup>4</sup>. Similarly, an A.C. Nielsen study found pre-recorded play (two hours and 26 minutes per week) to be higher than home recorded play (one hour and 20 minutes per week) (Warrens and Thompson, 1992). While there has been no more recently published research from the United States,

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4. Sims (1989) also compared VCR use within four demographic subgroups and found in each case that VCRs were predominantly used to view pre-recordings.



Levy (1996) suggests that *“time shifting has largely dropped out of VCR use in the US. What we are using VCRs for is almost exclusively as a playback device for rented movies”* (email 7 July).

In New Zealand, VCR penetration has been about five years behind the trends evident in the United States; consequently our VCR viewing trends also lag behind the United States patterns. AGB McNair (1991) found that, on average, there were 16 minutes of coded (home recorded) playback per day, compared to 13 minutes of uncoded (pre-recorded) playback<sup>5</sup> per day (Mojo, 1994). In 1994, Mojo reported that coded versus uncoded playback was roughly 50/50. More recently pre-recorded viewing has become more prominent than home recorded viewing; that is, on an average day 0.4 percent of the population watch uncoded tapes compared to 0.3 percent who view coded tapes (Jones, 1996). This trend does not yet appear to be evidenced across all demographic groups. For example, New Zealanders aged 50 plus still watch more home recorded programmes than pre-recorded tapes (Mojo, 1994; Jones, 1996), as shown in Table 2.

**Table 2. Proportion of the sample by age groups who view coded and uncoded tapes per day (10 March - 6 April 1996)**

Viewing	Age Group			
	All 5+ %	5-17 %	18-49 %	50+ %
Coded	0.3	0.2	0.3	0.4
Uncoded	0.4	0.5	0.5	0.2

Source: Adapted from Jones (1996)

VCR use in the USSR, Middle East, and Third World countries has not followed the trend of Western countries; instead, VCRs have been used exclusively for playing pre-recorded tapes, with time shifting being virtually non-existent (Boyd and Straubhaar, 1985; Boyd, 1987; Cohen, 1987; Levy, 1989; Dobrow, 1990). A large number of the

5. 'Coded' and 'uncoded' tapes are terms associated with FingerPrinting technology, a method for collecting time shifting data. See chapter 4 for more information.

pre-recorded tapes played are from the Western world and, in some countries, such as the USSR, Soviet-Bloc countries and Arabian Gulf states, there are large black markets for such tapes (Boyd, 1987; Boyd, 1989; Dobrow, 1990). The high levels of pre-recorded viewing in the Third World may also be due to the lack of broadcasts available.

Researchers have found variations in the use of VCRs due to other variables. When Dobrow (1990) compared the VCR use of light and heavy viewers in Boston in 1986, he found that *"while heavy viewers used their VCRs primarily to time shift, lighter viewers used the technology primarily to view pre-recorded video cassettes"* (p.76). Sims (1989) found that non-cable homes devoted more time to playing pre-recorded tapes than pay cable homes (4 hours versus 2.9 hours), while pay cable households watched more home recorded tapes than non-cable homes (1.4 hours versus 1.1 hours). These figures suggest that as the penetration of cable increases, pre-recorded viewing is likely to decrease, home recorded viewing is likely to increase, but pre-recorded viewing will still be the dominant form of VCR viewing.

Previous research suggests that the ratio of pre-recorded viewing to time shift viewing in New Zealand will continue to increase, following the trend of the United States. To understand the implications of this trend, VCR viewing levels need to be compared to live viewing levels. For example, if VCR viewing is increasing compared to live viewing, time shift viewing may be increasing compared to live viewing. On the contrary, if VCR viewing is decreasing compared to live viewing, the question of whether ratings should include time shift viewing will diminish in importance.

The following section compares levels of time shift viewing and live viewing to investigate whether time shift viewing has the potential to affect programme audiences even though VCRs are no longer predominantly used to play time shifted material.

## 2.2 Time Shift Viewing versus Live Viewing

Although programme audiences are made up of live viewers and time shift viewers, at present the New Zealand ratings measure only live viewers. Research has consolidated live and time shift audiences to explore the proportion of the total ratings made up of VCR ratings. Estimates of time shifting behaviour have varied. Recent studies from the United States, and the United Kingdom have estimated the proportion of time shifting to be two to three percent of a programme's total audience (Sims, 1989; Robbins, 1996). In New Zealand, Jones (1996) estimated that time shift viewers constitute 2.7 percent of the average television audience. An earlier study suggested, however, that up to 10 percent of total television viewing could be comprised of time shift viewing (Kirkham, 1982), although the calculations used to arrive at this estimate appear to be flawed, as discussed below.

At the time of Kirkham's (1982) study, VCR households made up only seven percent of the UK population. Kirkham (1982) estimated that VCR households played back about three and three-quarter hours of time shift material per week. He concluded that this was *"equivalent to about 10 percent of the total viewing of the UK population"* (p. 405). The flaw in his calculation was that the time shift viewing measure was averaged across VCR households not the whole population. Kirkham's estimate of time shift viewing contributing 10 percent to total viewing hours should, therefore, only be applied to VCR households, and not used as an estimate for the whole population. Re-calculating his estimates reveals that time shifting comprised only 0.7 percent<sup>6</sup> of total viewing - somewhat less than the more recent estimates which reflect higher VCR penetration rates.

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6. Contribution of VCR homes to population viewing:		Contribution of non-VCR homes to population viewing:	
7% of population x 90% <i>live</i> viewing	=>	6.3%	93 % of population x 100% <i>live</i> viewing =>
93%			
7% of population x 10% <i>time shift</i> viewing	=>0.7%		

<i>For total population:</i>	Time shift viewing =	0.7%
	Live viewing	= 99.3%

Even though the average time shift audience of programmes is estimated to be much smaller (3%) than the live audience (97%), these generic proportions may mask variations which occur across individual programmes. Recent studies from the United Kingdom have reported that some programmes have very high proportions of time shift viewing, that is, the top twenty VCR rating programmes for November 1995 had VCR ratings ranging from 3.2 percent for *Cracker* to 1.7 percent for *Coronation Street* (Robbins, 1996). These ratings are considerably higher than average VCR ratings which are around 0.3 percent. As another example, 2.334 million time shifters watched *Wallace and Gromit* (an animation) in December 1995 in the United Kingdom; time shift viewers comprised 22 percent of the total audience for the programme (AGB Television, 1995).

A recent study in New Zealand found similar results to United Kingdom studies. That is, of programmes that were screened in April 1994, *Rain Man* (a movie) had the largest time shift audience of 32,863 households which comprised 24 percent of the total audience, and time shift viewing of NBA basketball constituted 21 percent of the household audience (Mojo, 1994). It is unclear from Mojo's (1994) report whether the analysis included all playbacks of tapes by different household members or only the first playback for the household. If all playbacks were included this would inflate the proportion of household time shift viewing, as a programme can only be viewed live once by the household but it can be played back many times by different individuals within the household. Even so, these results and the United Kingdom studies suggest that some programmes have much higher proportions of time shift viewing than others, accounting for thousands of programme viewers.

Factors that are believed to influence time shift viewing levels are detailed in the remaining sections of this chapter.

## 2.3 Time Shift Viewing across Programme Genres

Overall time shifting appears to make up only a small proportion (3%) of total viewing, however, within certain programme genres time shift viewing has been found to be much higher. In general, movies have the highest levels of time shift viewing, followed by soap operas, dramas, and comedies (Arbitron, 1979; Levy, 1980; Agostino et al, 1980; Levy, 1981; Kirkham, 1982; Byington, 1983; Darkow, 1984; Fiddick, 1984; Singer, 1986; Gunter and Svennevig, 1988; Gunter and Wober, 1989; Mojo, 1994; Robbins, 1996); whereas sports, documentaries, and children's programmes have much lower levels of time shift viewing (Levy, 1980; Kirkham, 1982; Byington, 1983; Darkow, 1984; Fiddick, 1984; Kaplan, 1985; Gunter and Wober, 1989; Robbins, 1996). The researchers which have quantified levels of time shifting across programme genres have used three measures<sup>7</sup>: percent of recordings, percent of replays, and VCR contributions to programme ratings.

Kirkham (1982) found that the majority of programmes recorded were 'feature films' (45%), while sports programmes were least recorded (3%). Byington (1983) found similar results with movies consisting of 33 percent of recordings, followed by TV series (25%) and soaps (20%); sporting events (2%) and children's programmes (3%) had the lowest levels of recording.

Since all recordings are not played back, results based on recordings may give inaccurate levels of time shifting across programme genres - if recordings of some programme genres are more likely to be played back than others. Levy (1980a) found that the genres that were most frequently recorded and played back had very similar proportions of recording and play back. Darkow (1984) reported only "*slight differences*" between the proportions of recording and playback across programme genres; however, he included playbacks of pre-recorded tapes in the feature films category. Recalculating Darkow's (1984) figures to exclude pre-recordings, decreased the reported proportion of feature

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7. Not all of the research referenced in this paragraph has quantified levels of time shifting across programme genres, some have only listed genres with higher and lower levels of time shifting.

film playbacks from 61 percent to 38 percent. Darkow's recalculated figures are presented in Table 3.

**Table 3. Recording versus playback of programme genres**

Genre	Recording %	Playback <sup>1</sup> %
Feature films	50	38
Television series	22	30
Light entertainment	15	17
Information	9	10
Sport	4	5
Total	100	100

Source: Darkow (1984)

1. Playback figures adjusted to exclude playback of pre-recordings.

After recalculating Darkow's figures, feature films still had higher levels of recording and playback than the other programme genres. However, comparing recording to playback (see Table 3), a larger proportion of feature films were recorded than played back, whereas a larger proportion of television series were played back than recorded.

Levy and Gunter (1988) also measured both recording and playback of programme genres, but found different results to other studies. Instead of movies having the highest levels of time shifting, US drama series were most likely to be recorded and UK drama series were most likely to be played back. Gunter and Wober (1989) claimed that Levy and Gunter's study found different results to previous studies because their study was based on diary data whereas earlier studies were based on questionnaire surveys. However, this does not seem to be the case as Darkow's (1984) study was based on diary data. There does not seem to be any obvious reason for the different results. Levy and Gunter's (1988) study did find that some programme genres were more likely to be recorded than played back, but the genres that this affected were different from Darkow's (1984) study.

There is no conclusive evidence that VCR recordings are an inappropriate measure of time shifting across genres, although actual VCR playback is obviously a more realistic measure. Levy (1980) used a diary survey to analyse playback within United States households in 1979 - the results are presented in Table 4. Although his results are almost twenty years old, the programme genre rankings are very similar to those of recent studies (Mojo, 1994; Robbins, 1996)<sup>8</sup>, with movies, comedies, and soap operas making up reasonably large proportions of all playbacks.

**Table 4. Proportion of playbacks across programme genres**

Programme genre	Playback %
Movie	23.15
Situation comedies	14.56
Soap operas	11.69
Entertainment series	8.71
Entertainment specials	5.73
"Kids-vid"	5.01
Police / Detective	4.89
News / Public affairs	4.18
Dramatic series	4.18
Talk shows	3.93
Mini-series	3.22
Sports	3.10
Science Fiction	2.63
Miscellaneous	2.37
Unclassifiable	2.65

Source: Levy (1980)

Warrens and Thompson (1992) also quantified levels of time shifting across programme genres. They calculated the contribution of VCR ratings to total ratings for different

8. These studies did not report the actual proportions of playback across genres, only the most preferred genres.



programme genres, a measure which estimates the effect of time shifting on programme ratings. Only a couple of programme genres were reported and some were classified by day part. Daytime dramas had the highest VCR contribution to ratings of 12 percent; that is, 12 percent of the total audience to the average daytime drama was made up of time shifters. Feature films had the next highest VCR contribution of five percent, followed by prime time dramas (3%) and prime time sitcoms (2%).

To summarise, some researchers have used recording levels to estimate playback levels (or time shift viewing) across programme genres. Logically then, playback levels are a more precise measure of variations in time shifting across genres. Playback levels, however, do not explain how variations in genre time shift levels affect programme ratings. To date, only one study has examined *VCR rating contributions* across a few programme genres. Further research into VCR contributions variations across programme genres is needed to gain an estimate of the omitted viewing audience within current ratings, especially within the movie genre.

## 2.4 Time Shift Viewing across Stations

The television stations on which programmes are broadcast also appears to influence time shift viewing levels. Generally programmes are more likely to be time shifted if they broadcast on stations with high viewing shares (Kirkham, 1982; AGB McNair, 1991; Mojo, 1994; Robbins, 1996). New Zealand has three national free-to-air stations (TVNZ1, TVNZ2 and TV3), five Sky TV (pay) stations, and a number of local stations. TVNZ1 and TVNZ2 have the highest viewing shares, followed by TV3 which is the most recently introduced free-to-air national station; Sky TV and local stations have very low channel shares. A recent study found that 35 percent of *recordings* were of TVNZ1 programmes, 37 percent of TVNZ2, 21 percent of TV3, and the remaining seven percent of recordings were of Sky TV and other stations (Jones, 1996).



A study by Mojo (1994) also compared recording shares across stations and then compared them to current live viewing shares - these results are presented in Table 5.

**Table 5. Live viewing and recording shares (all people 5+)**

Station	Live viewing %	Recording %
TVNZ1	43	39
TVNZ2	37	39
TV3	18	21
Sky TV / Other	2	2

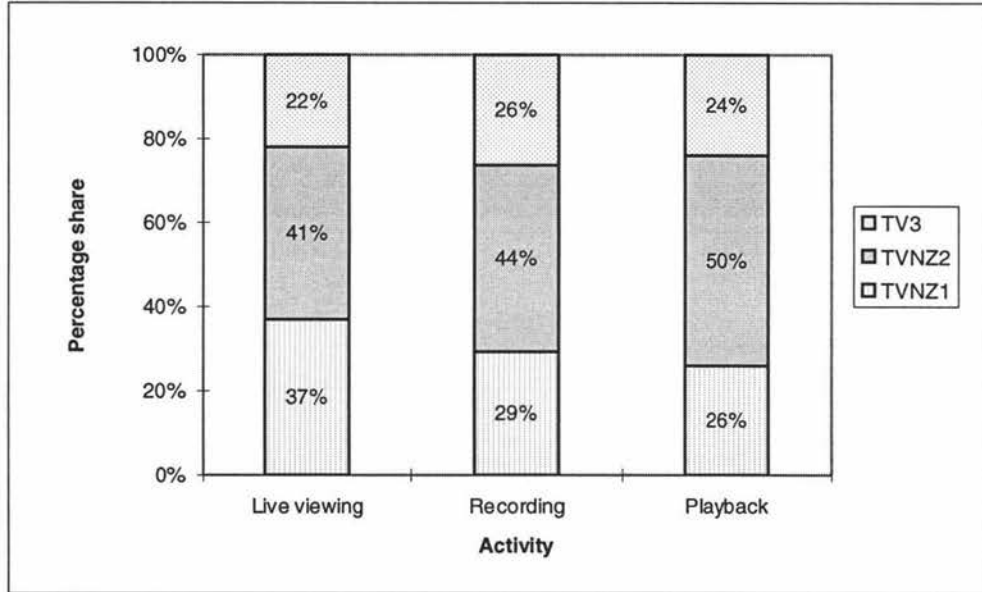
Source: Mojo (1994)

TVNZ1 had a higher live viewing share than TVNZ2, but they had similar recording shares. The Mojo (1994) study suggested that this was due to programme genre effects, for example, movies are one of the most likely genres to be time shifted and TVNZ2 broadcasts more movies than TVNZ1.

Table 5 shows that Sky TV and the other stations accounted for 2 percent of viewer's recording. Sky Movies was the most likely Sky channel to be taped, which provides further evidence that movies have high time shift viewing levels. In Jones' (1996) later study, the recording share of Sky TV and other stations had increased to seven percent; this coincides with the increase in Sky TV penetration and the increase in the number of local stations within this period. Therefore, the recording shares of Sky TV and other stations may continue to increase as the penetration of these stations increases.

Levels of playback across stations seem to be slightly different to levels of recording. AGB McNair (1991) compared live viewing, recording and playback shares across New Zealand's three national free-to-air stations, as shown in Figure 3.

**Figure 3. Live viewing, recording and playback shares by station in VCR homes (29/7/91 - 4/8/91)**



Source: AGB McNair (1991)

Note: Analysis based on 28 days from recording.

The recording and playback shares in Figure 3 both show that stations with larger live audiences also have larger time shift audiences; however, measuring time shifting by recording appears to distort the time shift viewing shares because the stations have different playback rates. TVNZ1 and TV3 had higher levels of recording than playback compared to TVNZ2, while TVNZ2 had comparatively higher levels of playback than recording. There was also a larger difference between playback shares of TVNZ1 and TVNZ2 than between the recording shares of these stations.

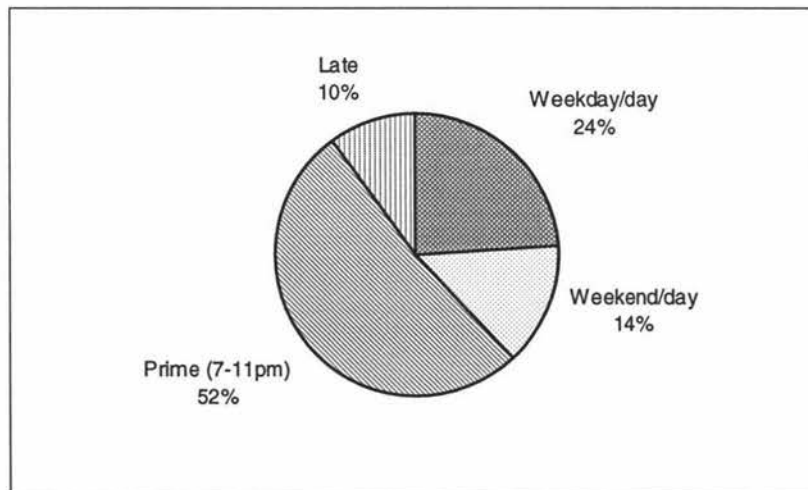
Since stations with higher live audiences also have higher time shift audiences, it seems that the effect of time shift viewing on total audiences may be quite similar between stations. For example, if one station had large audiences of 10,000 live viewers and 1,000 time shift viewers, and another station had small audiences of 100 live viewers and 10 time shift viewers, the contribution of time shift viewing to total viewing for both stations would be the same (10%). To date, research has not compared live and VCR ratings across stations; these details are needed to estimate whether the proportions of programme audiences not included in the current ratings differ across stations.

## 2.5 Time shift Viewing across Times and Days

The time of day and day of week that a programme is broadcast may also influence time shift viewing levels. Researchers have examined *recording* levels across times of the day and days of the week. As previously discussed, recording levels are not the best measure of time shifting, because not all recordings are played back, and playback rates may differ across different times of the day and days of the week. However, considering that there are no studies that have compared playback levels or ratings, recording levels can be used as an estimate of time shifting levels.

Recording levels across times of the day generally follow live viewing levels, with the majority of recording occurring at prime time (that is, between approximately 7pm and 11pm, depending on the researcher) (Agostino et al, 1980; Levy, 1980; Metzger, 1986; Mojo, 1994; Robbins, 1996, Jones, 1996). Metzger (1986) reported that 52 percent of recorded hours were taped in prime time (see figure 4).

**Figure 4. Proportion of hours taped by day part**



Source: Metzger (1986)

Furthermore, AGB McNair found that ten percent of homes recorded programmes between 8.15pm and 8.45pm (Mojo, 1994). Jones (1996) found “*a definite lunchtime*

*peak with a smaller less defined peak in the morning*" during weekdays (p.1). Levy (1980) also found a lunchtime peak on Saturdays.

Across days of the week, research has found that weekends rather than weekdays have higher levels of recording (Metzger, 1986; Mojo, 1994). Mojo (1994) found this to be the case on all New Zealand channels. During the weekend, studies have found Sundays to have the highest level of recording (Sims, 1989; AGB McNair, 1991; Jones, 1996). Estimates of recording levels on Saturdays have varied: Sims (1989) found the lowest level of recording for all days of the week occurred on Saturdays, whereas AGB McNair (1991) found Saturdays to have the second highest level of recording (see Table 6). Sims' (1989) results only included prime time recording, which is a probable explanation for the differences in the results.

**Table 6. Proportions of recording minutes across days of the week**

Day	Sims (1989) %	AGB McNair (1991) %
Monday	15	13
Tuesday	13	10
Wednesday	12	15
Thursday	14	11
Friday	11	12
Saturday	9	17
Sunday	26	21

Source: Sims (1989) and AGB McNair (1991)

Although the majority of time shifted programmes are recorded in prime time and on weekends, it is unknown how many of these recordings are played back. Perhaps programmes recorded on weekdays are more likely to be played back, resulting in higher time shifting levels compared to weekends. Further research is needed to investigate whether different broadcast times and days cause variations in playback levels.

## 2.6 Time Shift Viewing across Demographic Groups

Various studies have found that women are more likely to time shift programmes than men (Lindstrom, 1989; Gunter and Wober, 1989; Sims, 1989; Robbins, 1996). Gunter and Wober (1989) found that, on average, women played 1.7 home recordings per week, whereas men played one recording per week. Lindstrom's (1989) study of heavy recording households found that women (aged 18+) taped 69 percent of recordings, while men (aged 18+) recorded 31 percent. Sims (1989) studied a number of demographic groups - his results are presented in Table 7.

**Table 7. Average daily minutes per VCR home (24 hour basis)**

Demographic group	Playback minutes
Men 18+	3.4
Women 18+	5.1
Teens 12-17	3.4
Children 2-11	4.3

Source: Sims (1989)

As well as women playing more home recording minutes than men, Sims (1989) also found that children had higher levels of time shifting than men (aged 18+) and teenagers. Furthermore, Jones (1996) studied playback rates of slightly different age groups, and found that home recorded tapes had *"a high likelihood of being watched by those over 50 than those under 17 with 18-49's being very similar to all 5+" (p.1).*

The research suggests that women, children, and people aged 50 plus are more likely to time shift programmes. To relate these findings back to variations in the time shift viewing of programmes, further research should investigate whether programmes that are predominantly watched by women, children, or people aged 50 plus have higher VCR ratings.

## 2.7 Summary

The research to date has found that, overall, pre-recorded viewing has replaced time shifting as the predominant use of VCRs, and that the extent of time shift viewing is low. However, time shift ratings have been found to be as high as 3.2 and, considering that a high live rating is around 20, it is clear that overnight ratings may underestimate the total viewing audience of some programmes. The extent of this problem remains unquantified because of the limited work undertaken thus far.

Although it has been documented that some variables that may lead to higher time shift levels, such as, the programme's genre, the broadcast channel, the time and day of broadcast, and the demographics of the audience, the specific effects of these variables on programme ratings remain less clear. If stable patterns in time shifting behaviour exist, it may be possible to develop factors which could be used to adjust the overnight ratings and thereby model the likely final audience of programmes.

## **CHAPTER 3. MEASURING TIME SHIFT VIEWING**

Researchers have studied a number of important issues relating to the measurement of time shifting behaviours, namely, whether to use VCR recording or VCR playback to measure time shifting, whether to include the frequency of playback in VCR ratings, and how long it takes for VCR playback to occur from the time of recording. This chapter summarises and discusses the findings that have emerged to date.

### **3.1 Levels of Recording and Playback**

Rating companies around the world use either VCR recording or VCR playback to measure time shifting behaviour. Methodologies which document VCR playback, count a programme as time shifted when it is actually played back. Although this is the more logical and direct measure of time shifting behaviour, it can not be included in the overnight ratings.

Alternatively, methodologies which document VCR recordings, count a programme as time shifted when it is recorded. As a result, an estimate of time shift viewing can be included in the overnight ratings. However, this method assumes that all recordings are played back; that the correlation between playback and recording is one. Yet research has found that the level of VCR recording is typically much higher than the level of playback (Levy, 1981; Stoessl, 1982; Levy, 1983; Hunt, 1987; Sims, 1989; AGB McNair, 1991; Warrens and Thompson, 1992; Mojo, 1994), thus seriously questioning the validity of VCR recording as a measure of time shifting behaviour. Researchers have used three variables to compare VCR recording and playback: percent of programmes, percent of households, and percent of minutes. This variation in the measures used makes direct comparisons difficult, although overall patterns can be explored.

The first measure used by researchers to examine recording and playback levels compared the proportion of programmes; the findings suggest that more programmes are recorded than played back. Levy (1983) estimated that the average VCR household recorded 3.31 programmes a week and played back 2.42 programmes a week, which is equivalent to a 73 percent playback rate. An AGB (UK) survey claimed that “*of every 100 programmes recorded, 13 were never played back, or not within the period of the study*”<sup>1</sup> (Fiddick, 1984, p.14). In a more recent study, Mojo (1994) examined nine specific programmes and found that the proportion of playbacks varied across programmes. For example, 64 percent of the recordings of *World Around Us* were played within 4 weeks, while only 34 percent of the recordings of *Rugby - NZ Big Game* were played back within this period. As yet, the extent to which playback levels vary across programme genres is not clear.

Secondly, researchers have compared the recording and playback levels of households. Levy (1981) analysed the proportion of VCR households that recorded and played back programmes within one week during 1979. He found that “*during the diary week 80.8% of VCR households recorded at least one broadcast ... and 74.7% replayed one or more tapes of previously recorded programmes*” (p.402). This finding complements the previously mentioned studies, that is, more broadcasts are recorded than played back (Levy, 1981; Levy, 1983; Fiddick, 1984; Mojo, 1994). Other studies have measured the number of minutes recorded and played back.

Research based on minutes is difficult to compare as several factors, which are generally not discussed by the researchers, may influence some results more than others. For example, if the number of minutes recorded is greater than the number of minutes played back, researchers have assumed that not all programmes have been played back, although other evidence relating to viewers’ playback behaviour suggests that such differences are almost certainly attributable to fast forwarding (Yorke & Kitchen, 1985; Kaplan, 1985; Papazian, 1986; Reiss, 1986; Metzger, 1986; Gilmore, Secunda & Warrens, 1991;

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1. Fiddick (1984) did not state the time period of the study.



Cronin & Menelly, 1992). In addition, some researchers have included multiple playbacks of a taped programme in their playback estimates, while others have only included the first playback of a programme, ignoring any subsequent playbacks.

Studies that excluded multiple replays found more minutes were recorded than played back. A.C. Nielsen drew a convenience sample from their people meter panel, to gain some preliminary insights into panel members' VCR viewing behaviour (Hunt, 1987). The minutes were reported on a household basis and excluded recordings that were viewed live, on the grounds that these were less likely to be played back (as found by Levy (1983)). Hunt's (1987) study found that within 28 days, 57 percent of recorded minutes were played back in the April/May study, and in the July study, only 44 percent of recorded minutes were played back. The difference in these results may be explained by the different seasons; that is, respondents may have spent more time outdoors and less time watching television in July, as July is warmer than April and May in the United States.

In a New Zealand study, AGB McNair (1991) compared the number of minutes recorded and played back by VCR households and by individuals in the VCR households. The study found that, on average, individuals recorded 87 minutes in a week but of those minutes only 29 minutes were played back within 28 days, that is, only 33 percent of recorded minutes were played back over 28 days. Similarly, for households only 34 percent of recorded minutes were played back over 20 days. Some of the recorded minutes which were not played back in the study may have been zipped during commercial breaks, even so, there would still be a large proportion of recorded programme minutes not played at all.

The previously mentioned studies by A.C. Nielsen and AGB McNair excluded multiple replays, that is, the analyses only included the first playback of recordings, and found that more minutes were recorded than played back. In contrast, other studies have included

multiple replays in their results and have found that more minutes are played back than recorded (Metzger, 1986; Lindstrom, 1989).

Metzger (1986) reported that, on average, people from VCR households taped 12 minutes and played back 19 minutes of television on weekdays, and during the weekend taped 15 minutes and watched 25 minutes of playbacks per day. He estimated that there are 1.6 hours of playback per one hour of taping. A limitation of his study was that each respondent had to account for the entire family's VCR activity, which may have required a certain amount of guesswork, and thus introduced unquantifiable error to the results (Hunt, 1987).

Lindstrom (1989) found similar results to Metzger (1986). He measured the number of minutes recorded and played back between 1985 and 1987, the results are presented in Table 8.

**Table 8. Average minutes recorded and played back per week in VCR households**

	Year		
	1985	1986	1987
Minutes recorded	171	172	154
Minutes played back	253	273	258
Playback : recording	1.5:1	1.6:1	1.7:1

Source: Lindstrom (1989)

The increase in the ratios of playback to recording between 1985 and 1987 seem to suggest that the number of multiple replays per tape are increasing. This raises some interesting questions about the relationship between time shifting behaviour and programme frequency. The frequency of playback and its relation to programme ratings is discussed in more detail in section 3.2.

Other researchers have not stated whether they included multiple playbacks or only the first playback of recordings in their analyses. Therefore, it is difficult to interpret the results and compare whether their results support or contradict the previously mentioned studies. These studies are briefly discussed below; all found that more minutes were recorded than played back.

Kirkham (1982) found that there were four hours and eight minutes of recording per week compared to three hours and 44 minutes of viewing per week, that is, 90 percent of recorded minutes were played back. Kirkham (1982) described very little about his survey methods, it is unclear whether his figures are based on households or individuals or whether multiple playbacks were included. Sims (1989) conducted two studies, one in January and the other in April. He found that, on average, VCR homes devoted 2.4 hours per week to recording in both months. Although, in January, VCR homes played back 1.2 hours per week, and in April, they played back one hour per week. January may have had slightly more hours of playback because it is a colder month and people are more likely to watch television. Warrens and Thompson's (1992) study of A.C. Nielsen data found 1.6 hours of recording and 1.2 hours of playback per week, that is, 76 percent of recorded minutes were played back.

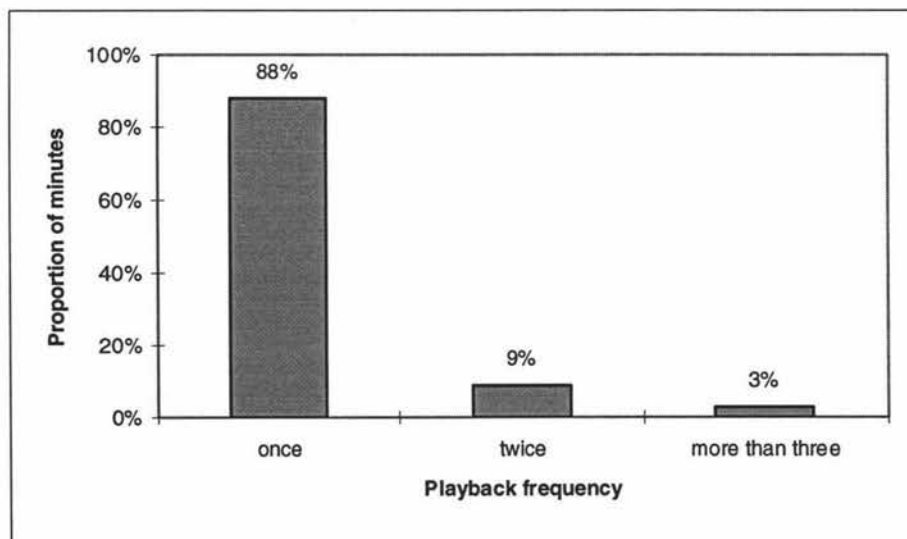
Researchers who excluded multiple replays found that many recordings are not played back; this suggests that VCR playback is the more logical and conservative measure of time shifting behaviour. Rating services that use VCR recording to estimate time shifting behaviour may be overestimating time shift audiences by up to 65 percent. Studies that have included multiple replays have found recordings that are played back are often played more than once. This is an important factor to consider when measuring VCR playback. Research has investigated the frequency of playback, the results are presented in the following section.

### 3.2 Frequency of Playback

Before VCRs were introduced programmes could only be viewed once, unless the broadcast was repeated. With the introduction of VCRs individuals are able to view broadcasted programmes many times. A number of studies have explored the number of times that home recorded tapes are played back.

The following studies, which are based on three different measures, suggest that the majority of tapes are played back only once. Arbitron's (1979) study of early VCR usage, found that of the three most recent recordings, 48 percent were played back once, nine percent were played back twice, five percent were played back three or more times, and 38 percent had not yet been replayed. Metzger (1986) found that the majority (64 percent) of respondents replayed tapes only once, 18 percent twice and 18 percent of people watched tapes three times or more. AGB McNair (1991) investigated the frequency of minutes replayed over 20 days within VCR households, and found that the majority of minutes are replayed only once - the results are presented in Figure 5.

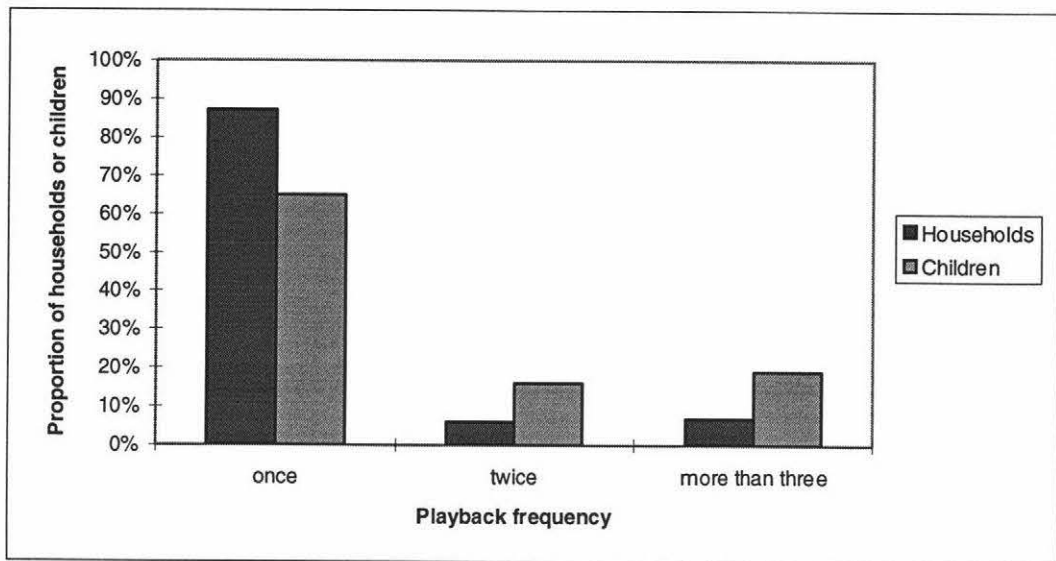
**Figure 5. Playback frequency (minutes 2/9/91 - 22/9/91)**



Source: AGB McNair (1991)

A.C. Nielsen found that the frequency of playback varied across demographic groups (Hunt, 1987). Specifically, a large majority (90%) of males and females viewed home recorded tapes only once. Compared to adults, children were much more likely to view multiple replays. Figure 6 presents the frequency of playback for children and households (which included all family members).

**Figure 6. Playback frequency of households and children**



Source: Hunt (1987), July study

The accumulated evidence suggests that some home recorded tapes are played back more than once (especially by children). This raises the issue of whether multiple playbacks should be included in VCR ratings. Multiple playbacks increase the frequency of programmes, whereas ratings are a measure of programme reach. AGB McNair, for example, describe ratings as: *“a survey estimate of the size of an audience expressed as a percentage of the total group sampled or potential”* (p.18). Multiple playbacks of programmes by individuals should, therefore, be discarded from the calculations of VCR ratings, as including them would inflate the actual time shift audience of programmes.

It maybe useful for advertisers, if the rating companies also reported the average frequency of programmes, given that multiple playbacks of programmes increase the

frequency of advertisement exposure. For example, it was estimated that 19 percent of children who watch a time shifted programme watch it at least three times and, therefore, they may also see the advertisements at least three times, assuming that the advertisements are not zipped or zapped.

Another issue to consider in the measurement of VCR ratings is the time period within which recordings are played back.

### 3.3 The “Viewing Lag”

Time shift viewing is not included in overnight ratings, due to the delay between recording and playback, or the *viewing lag*. Given that the viewing lags of some programmes may be very long, the ratings services need to know the time frame within which the majority of recorded programmes are played back, so that VCR ratings can be released within a reasonably short period of time.

To examine average viewing lags, some researchers have studied the proportion of recordings played back over a certain period, while others have limited their study to include only programmes that are actually played back, that is, ignoring recordings that are not played back. The following sections detail the results from both types of analysis, and then examine factors that appear to influence viewing lags.

#### 3.3.1 Proportion of Recordings

Levy (1981) found that “*almost 80 percent of all recordings were replayed within the diary week*” (p.402). His data was collected from a one week diary survey; it is unclear whether “*all recordings*” included only recordings made within the diary week or whether he also included recordings made outside the diary period. Levy (1981) also

studied the proportion of tapes replayed over other time periods - his results are presented in Table 9.

**Table 9. Replay delay of recordings**

Tapes replayed on:	Recordings %
same day	29.9
day after	29.1
2-3 days after	13.0
4-7 days after	7.6
8-30 days after	9.4
1 month or more	11.0
Total	100.0

Source: Adapted from Levy (1981)

The results in table 9 are dubious for a number of reasons. Firstly, replays were measured *8-30 days* and *1 month or more* after recording, even though the sample period was only one week. Secondly, the results indicate that all recordings were played back, even though previous research has found that many recordings are not played back (Levy, 1981; Levy, 1983; Fiddick, 1984; Hunt, 1987; AGB McNair, 1991; Mojo, 1994). As a possible explanation it seems that Levy's (1981) results were actually based on the proportion of playbacks which occurred over the one week diary period. Obviously his results need further explanation before they can be accurately interpreted and compared to other research.

In another study, Levy (1983) estimated that 52.7 percent of all programmes recorded during one week were also played back during the same week. This measure, however, is likely to be influenced by the playback patterns of programmes recorded at the beginning of the week, as these recordings had six days to be played back, whereas recordings at the end of the week had less than one day to be played back. In a later article, Levy and Fink (1984) recalculated Levy's (1983) figures (by averaging the

proportion of playbacks for each elapsed day from recording), and found that 58.2 percent of recordings were played back within one week of their broadcast (see Table 10).

**Table 10. Percentage of recordings by elapsed days**

Elapsed days	Recordings %
0-1	23.8
1-2	19.7
2-3	7.4
3-4	3.2
4-5	2.2
5-6	1.3
6-7	0.6
0-7	58.2

Source: Levy and Fink (1984)

Table 10 shows that over seven days the highest proportion of recordings (24%) were played back in less than one day from broadcast, followed by rapidly declining proportions as the number of elapsed days increased. Of the remaining 41.8 percent of programmes not replayed within seven days, Levy and Fink (1984) expected that a small proportion would be replayed but most recordings would not be replayed at all.

In another study, Robbins (1996) reported that *"90 percent of all recorded material is played back, if viewed at all, within the seven-day period"* (p.15). Compared to other studies, this estimate seems to be very high; however its accuracy remains unclear as Robbins (1996) did not report the research procedure.

Although analysing the proportion of *recordings* replayed over time provides some insight into time shift viewing lags, the proportion of *playbacks* is more relevant to the



measurement of VCR ratings, as this measure excludes recordings that are not played back, that is, are not time shifted.

### **3.3.2 Proportion of Playbacks**

Research which has analysed the proportion of playbacks, estimates that approximately half of all playbacks occur within two days of recording, and a large proportion are played back within one week from recording (Fiddick, 1984; Hunt, 1987, AGB McNair, 1991). Hunt (1987) found that 99 percent of all playbacks were played within one week from recording, with 60 percent of playbacks occurring on the same day or the day after recording.

AGB McNair (1991) found that a smaller proportion, that is, 75 percent, of playbacks occurred within one week. AGB McNair (1991) probably found lower proportions of playbacks compared to Hunt (1987), because Hunt's (1987) study was based on recordings played back within 28 days from the day of broadcast, whereas playbacks in the study by AGB McNair (1991) had a longer period to be played back<sup>2</sup>. The results of the AGB McNair (1991) study are presented in Table 11. The highest proportion of playbacks were played on the day after recording.

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2. In AGB McNair's (1991) study, the introduction of FingerPrinting technology in New Zealand determined the earliest time that playbacks could have been recorded; see chapter five for details on FingerPrinting technology.

**Table 11. VCR playback (1/7/91 - 28/7/91)**

No. of days recorded prior to playback	Percent %
Same	16
1	35
2-3	15
4-6	9
7-14	7
14-21	3
21 Plus	15
Total	100

Source: AGB McNair (1991)

The research suggests that time shift data collected two days after the day of broadcast would include half of all playbacks (or 60 percent of the playbacks which are recorded and played back within 28 days), whereas waiting until one week after the day of broadcast would include three quarters of all playbacks, (or 99 percent of playbacks which are recorded and played within 28 days). To report VCR ratings, ratings services must, therefore, make a compromise between the delay in the release of the ratings and the proportion of playbacks included. In the United Kingdom, BARB (the Broadcasting Audience Research Board) define time shifting as “*the cumulative audience who view a particular broadcast as video playback within 163 hours of its transmission*” (Robbins, 1996, p.15). In this case the release of VCR ratings would be delayed by one week, but the ratings would include a large majority of the time shifted programmes.

Research has also found viewing lags to vary across programme genres, recording modes, and household channel availability. These variations may create opportunities for the earlier release of VCR ratings.

### 3.3.3 Variations in Viewing Lags

Across programme genres, research has found that soap operas, dramas, and current affairs are played back faster than other genres, whereas movies have longer viewing lags (Levy, 1981; Levy, 1983; Fiddick, 1984; Mojo, 1994). The results of Levy's (1983) study are presented in Table 12. He suggested that movies have longer viewing lags, because they are often recorded and then stored in personal video libraries (Levy, 1983).

**Table 12. Percentage of recordings replayed during diary week by programme type**

Programme type	Proportion replayed %
All programmes	52.7
Soap operas	81.7
Dramatic series	77.3
Situation comedies	61.3
Police / detective	60.6
Entertainment series	48.9
Sports	47.9
Children's programmes	45.5
Broadcast movies	45.5
Pay-TV movies	33.3

Source: Levy (1983)

In another study, Levy (1981) found that 88 percent of soap operas and 50 percent of news and current affair programmes were played back on the day of broadcast, while only 30 percent of all playbacks were played on this day. Considering that such a high proportion of soap operas are played back on the day of broadcast, it is possible that VCR ratings of soap operas could be included in the overnight ratings.

Levy and Fink (1984) investigated the viewing lags of daily, weekly and one-shot programmes. Of all recordings played within one week, 79 percent were daily

programmes, 59 percent were weekly programmes, and 43 percent were one-shot programmes. As expected, the majority (55%) of daily programmes were played back on the same day of broadcast, while most weekly (25%), and one-shot programmes (18%), were played back on the day after broadcast. As a result, VCR ratings of daily programmes could be reported earlier than the VCR ratings of other programmes. This has potentially important implications for media planners and advertisers, who generally need to make faster decisions on daily programme slots than weekly programme slots.

Levy (1983) investigated two other factors that appear to influence viewing lags, namely, the activity of viewers while recording is taking place and the number of channels available in the household. The results are presented in Table 13.

**Table 13. Percentage of recordings played back during diary week by recording mode and cable status**

<i>Recording mode</i>	Proportion replayed %
Unattended recording	56.8
View one, record another	48.0
View and record	34.3
<i>Cable status of household</i>	
Cable	45.4
Not cable	58.1

Source: Levy (1983)

The proportions of replays by recording mode seem quite self-evident. Unattended recordings were most likely to be played back within a week, followed by recordings that were taped while another live programme was viewed off-air; in this situation viewers are likely to view their favourite programme off-air and tape their second choice. Recordings that were viewed as they were recorded were least likely to be played back within a week. The proportion of recordings that are not played back in each of the

recording modes are likely to confound the viewing lag results, as it seems that “view and record” recordings would have a lower playback rate than “unattended” recordings.

Cable households were less likely than non-cable households to replay recordings within the diary week. Levy’s (1983) explanation was that cable households have a greater variety and number of programmes to choose from, and that greater choice reduced their need to play back programmes quickly. However, as Levy’s (1983) results represent the proportion of all recordings played back, cable homes may, in fact, play back fewer recordings, rather than take longer to play back tapes. The possible implications of Levy’s (1983) results are: as the number and variety of stations in New Zealand increase, either the viewing lags of time shift programmes will also increase, or fewer recordings will be played back.

### **3.4 Summary**

It is important that researchers who investigate time shift viewing behaviours, or rating companies who report VCR rating are aware of three methodological issues relating to the measurement of time shift viewing. The first of these issues is: given the accumulated evidence suggesting that a large proportion of VCR recordings are not played back, VCR playback is the more logical and conservative measure of time shifting behaviour. Secondly, multiple replays of programmes by individuals should not be included in VCR ratings or other time shift audience measures as they inflate the actual time shift audience. Lastly, since VCR recordings may take months to be played back, a time period of one week seems to be the most satisfactory period to measure VCR playback as research has estimated that approximately three quarters of all playbacks are played within this time. This study investigates these issues further, as discussed in the research objectives in the following chapter.

## CHAPTER 4. RESEARCH OBJECTIVES AND METHODOLOGY

### 4.1 Research Objectives

The main objectives of this study were to examine the effect of VCR time shifting on television audiences and investigate the measurement of VCR ratings. Research to investigate these issues was carried out in three stages: the first stage examined the extent of time shift viewing in New Zealand, the second stage investigated variations in time shift viewing across a number of variables, and, lastly, the study examined issues relating to the current and future measurement of time shift viewing.

#### 4.1.1 The Extent of Time Shifting

The study examined the extent of time shift viewing in New Zealand to ascertain whether it had the potential to greatly affect programme ratings. In particular, the following objectives were explored:

- *to compare the average weekly viewing of time shifted material to the viewing of pre-recorded material.*
- *to estimate the proportion of average weekly television viewing comprised of time shifted material.*

The first objective investigated whether the predominant use of VCRs is changing from time shift viewing to pre-recorded viewing. In the early eighties, VCRs were predominantly used to play home recorded material; however, there is increasing evidence that viewers now play a greater proportion of pre-recorded material (Levy, 1980; Levy, 1981; Kirkham, 1982; Stoessl, 1982; Fiddick, 1984; Darkow, 1984; Metzger, 1986; Sims, 1989; Warrens and Thompson, 1992; Mojo, 1994; Jones, 1996).

Although this trend is evident in New Zealand, New Zealanders aged 50 plus still watch more home recorded programmes than pre-recorded material (Mojo, 1994; Jones, 1996). This study extends previous research by continuing to monitor the ratio of pre-recorded viewing to home recorded viewing. To understand the implications of the ratio, pre-recorded viewing levels were compared to live viewing levels. The study also examined whether the ratio varies across age and gender groups.

Objective two gives an intimation of the extent of time shift viewing in New Zealand. Recent studies suggest that, on average, time shift viewing makes up two to three percent of a programme's total audience (Sims, 1989; Robbins, 1996; Jones, 1996). This may seem to be only a small proportion of viewing, unlikely to affect overnight ratings substantially; however, these generic proportions appear to mask variations which occur across individual programmes (Mojo, 1994; AGB Television, 1995; Robbins, 1996). This study, therefore, examined the proportion of television viewing constituted by time shift viewing, and how the proportion varies across individual programmes.

#### **4.1.2 Variations in Time Shift Viewing Levels**

Research has found that time shift viewing levels vary across programme genres, broadcast channels, times and days of broadcast, and the demographics of the audience. The specific effects of these variables on VCR ratings remain less clear; therefore, this study investigated the following objective:

- *to examine variations in VCR ratings and VCR rating contributions across programme genres, stations, hours of the day, days of the week, and demographic groups.*

Firstly, this objective investigated the relationship between the variables and variations in VCR ratings. As this study was based on non-experimental data, it was not possible to determine whether the relationships were causal, that is, whether the variables caused variations in VCR ratings. Secondly, the study compared variations in VCR rating

contributions across each of the variables. VCR rating contributions measure the proportion of a programme's audience which is made up of time shift viewers. If reasonably large variations in VCR rating contributions exist across the variables, correction factors could be developed to include VCR ratings in the overnight ratings.

#### 4.1.3 Measuring Time Shift Viewing

The last stage of the study examined the measurement of time shift viewing. This section investigated issues relating to the current measures of time shift viewing, and then explored the possibility of developing other measures.

This study examined issues relating to the current calculation of VCR ratings, in order to confirm and extend previous research. The following objectives were investigated:

- *to compare the average number of programmes recorded per week to the number played back.*
- *to examine the average delay between recording and playback.*

The first objective investigated how many recorded programmes are played back. Previous research has found that not all recordings are played back; the most conservative estimate was that only 33 percent of recorded minutes are played back over 28 days (AGB McNair, 1991). Consequently, ratings that incorporate VCR recordings as a surrogate for time shift viewing (or VCR playback), overstate the size of the television audience. To investigate this further, the study compared the average number of programmes recorded and played per week by households, and whether the levels varied across programme genres.

The second objective examined how long it takes for VCR recordings to be played back. This has an important role in establishing the period of time before actual VCR ratings



can be calculated. The few studies that have investigated this issue have found that a large proportion of video playback occurs within one week of taping; this proportion has ranged from 75 to 99 percent, depending on how many days the recordings had to be played back (Fiddick, 1984; Hunt, 1987, AGB McNair, 1991). As well as calculating the average viewing lag, this study also compared the viewing lags of nine programme genres, as previous research had found that some programme genres are played back faster than others (Levy, 1981; Levy, 1983; Fiddick, 1984; Mojo, 1994).

The second part of this section investigated the future measurement of time shift viewing. Previous research suggested that the current methods of calculating VCR ratings are either inaccurate or can not be included in the overnight ratings (see chapter three). To investigate the possibility of improving the accuracy of the overnight ratings, the following objective was explored:

- *to propose methods of estimating accurate VCR ratings overnight.*

Research has not previously investigated the potentiality of estimating VCR ratings; this study provided an initial investigation.

The methodology used to investigate the research objectives of this study is explained in the following section.

## 4.2 Research Methodology

The data used in this study was obtained from AGB McNair's people meter panel, which is able to measure VCR recording and playback through FingerPrinting® technology. In practice this is a small device which is attached to the back of household VCRs; when a household records a programme the video tape is electronically imprinted (or "finger printed") with the date, time, and channel on a continuous basis. When the programme is played back, the "finger print" is recognised, and the people meter records when playback occurred, the duration of playback, and which member(s) of the household was watching.

The panel has a sample size of 440 households, which represents approximately 1200 individuals who are aged five and over<sup>1</sup>. Each household's recording activity and each individual's viewing behaviour was studied for a six week period beginning August 26, 1996 and ending October 7, 1996. The study included seven stations: three national free-to-air stations and four Sky TV (pay) stations.

A variety of different measures were used to quantify time shifting levels, including hours per week, number of programmes per week, live and VCR ratings, and VCR rating contributions. Live correction factors were also calculated to investigate the possibility of estimating VCR ratings. The calculation of ratings, VCR rating contributions, and live correction factors are detailed in Appendix A. The results of the study are presented and discussed in the following chapters.

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1. The sample is stratified by many variables, including region, area type, age of household shopper, household size, and weight of television viewing.

## **CHAPTER 5. THE EXTENT OF TIME SHIFTING: RESULTS AND DISCUSSION**

The first stage of this study measured the extent of time shift viewing in New Zealand, to ascertain whether it had the potential to greatly affect programme ratings. This involved comparing levels of time shift viewing to pre-recorded viewing levels to monitor the extent that VCRs are used for time shifting (section 5.1). The study also compared levels of time shift viewing and live viewing to examine the proportion of television viewing which is represented by time shift viewing (section 5.2).

### **5.1 VCR Use: Home Recorded versus Pre-recorded Viewing**

In the early 1980s, VCRs were predominantly used to play home recorded material, however, there is increasing evidence that viewers now play a greater proportion of pre-recorded material (Levy, 1980; Levy, 1981; Kirkham, 1982; Stoessl, 1982; Fiddick, 1984; Darkow, 1984; Metzger, 1986; Sims, 1989; Warrens and Thompson, 1992; Mojo, 1994; Jones, 1996). This trend is causing concern to broadcasters and advertisers alike, as pre-recorded tapes contain no advertising and take viewers away from live broadcast audiences. The net consequence of this is that programme and commercial audiences may be diminishing.

To investigate the use of VCRs, the total number of hours that all panel members spent viewing time shifted and pre-recorded material per week was calculated; the viewing hours were averaged over six weeks. The results presented in Table 14 are consistent with recent research (Jones, 1996); that is, New Zealanders now spend more time viewing pre-recorded material than they spend viewing time shifted material.

**Table 14. Playing of time shifted material versus pre-recorded material by all panel members per week**

Material	Average hours per week <sup>1</sup>	
	n	%
Time shifted	558	42
Pre-recorded	756	58
Total	1314	100

1. Includes multiple replays of tapes

Although the results reported in Table 14 show that viewers watch more pre-recorded than time shifted material, previous studies have found that this pattern varies across demographic groups (Mojo, 1994; Jones, 1996). Tables 15 and 16 explore this issue further.

**Table 15. Proportions of time shifted viewing versus pre-recorded viewing by gender**

Material	Male		Female		All	
	Hours <sup>1</sup>	%	Hours <sup>1</sup>	%	Hours <sup>1,2</sup>	%
Time shifted	197	37	346	47	558	42
Pre-recorded	333	63	389	53	756	58
Total	530	100	735	100	1314	100

1. Average viewing hours per week for all panel members, including multiple replays.

2. The average hours for all people are not equal to the sum of the average hours for males and females due to missing cases.

Table 15 compares levels of time shifted and pre-recorded viewing by gender. Females tended to use their VCRs to view approximately equal proportions of time shifted material and pre-recorded material, whereas males watched more pre-recorded material. Men and women also differed in the amount of VCR use; that is, compared to males, females viewed more time shifted and pre-recorded material.

VCR usage behaviour also varied across age groups. Table 16 shows that, as viewers' got older the proportion of time shift viewing relative to pre-recorded viewing increased. Other New Zealand research has found similar results (Mojo, 1994; Jones, 1996).

**Table 16. Proportions of time shifted viewing versus pre-recorded viewing by age groups**

Material	Age Group				
	5-19 % <sup>1</sup>	20-34 % <sup>1</sup>	35-50 % <sup>1</sup>	50+ % <sup>1</sup>	All %
Time shifted	29	36	40	63	43
Pre-recorded	71	64	60	37	58
Total	100	100	100	100	100

1. The actual number of hours that all panel members in each age group spent viewing time shifted and pre-recorded material per week is presented in Appendix B.

Further analysis of time shift viewing by gender within the 50 plus age group revealed that both males and females viewed more time shifted material than pre-recorded material. However, females watched a higher ratio of time shifted material to pre-recorded material; females also viewed more hours of time shifted and pre-recorded material than males.

The results of this study confirm that the aggregate pattern of VCR use obscures variations across demographic groups, providing potentially important information for the study of variations in time shift viewing levels. Tables 15 and 16 suggest that programmes which are predominantly viewed by females or people aged 50 plus may have higher levels of time shift viewing. Thus, it could be hypothesised that one of the influencing variables on VCR ratings is the predominant live audience for a programme. This hypothesis is explored further in section 6.5.

Overall, the results of this study are consistent with the patterns reported in earlier studies. In particular, these findings confirmed that the extent of time shifting relative to pre-recorded viewing is decreasing, and that people now use their VCRs to view pre-recorded material more than they do to view time shifted material. The data do not reveal whether the level of pre-recorded viewing is increasing or decreasing relative to live viewing. However, since pre-recorded viewing is equivalent to only four percent of total viewing<sup>1</sup>, it does not appear to be a significant threat to live viewing. This suggests that time shift viewing will also have little influence on live viewing levels. To investigate this further, the following section compares levels of time shift viewing to live viewing levels.

## 5.2 Time Shift Viewing versus Live Viewing

Recent studies have found that two to three percent of a programme's audience is constituted by time shift viewers (Sims, 1989; Robbins, 1996). To explore this issue, time shift viewing proportions were calculated using several measures. Table 17 presents the proportion of television viewing represented by time shift viewing, based on average hours per week and average ratings.

**Table 17. Proportion of television viewing constituted by time shift viewing**

Viewing	Hours per week				Average rating <sup>1</sup>	
	Excluding multiple replays		Including multiple replays		%	%
	n	%	n	%		
Time shifted	441	2	558	3	0.04 <sup>2</sup>	2
Live	17,869	98	17,869	97	2.00	98
Total	18,310	100	18,427	100	2.04	100

1. Average rating for all programmes viewed live.

2. Excluding multiple replays

1. Pre-recorded viewing / total viewing (excluding multiple replays) = 756 hrs / 19066 hrs = 4%

Over the sample period of six weeks, panel members viewed, on average, 17,869 live hours of television programmes per week across the seven stations; this is approximately 2.6 hours of viewing daily per individual. This level of viewing appears to be quite high and, in fact, is probably at its highest for the year, considering that the study was conducted in winter.

To compare live viewing hours to time shift viewing hours, multiple replays of programmes by individuals may be included or excluded. Including multiple replays reveals the total amount of time that panel members spent time shift viewing, whereas excluding multiple replays is more relevant to media planners as this measure enables calculations of the added audience to live programmes<sup>2</sup>. Using the latter measure, panel members viewed 441 hours of time shift material, on average, per week; this is equivalent to four minutes daily per individual. Overall, time shifting accounts for a very small proportion of total viewing hours (2%-3%), even when multiple playbacks are included.

The proportion of television viewing constituted by time shift viewing can also be measured by comparing live ratings and time shift (VCR) ratings. This study calculated average ratings for all programmes viewed live over five weeks<sup>3</sup> on seven stations. The final column in Table 17 supports the earlier finding, and the results of previous research (Sims, 1989; Jones, 1996; Robbins, 1996), that time shift viewing accounts for only a very small proportion of total viewing. Analysing the ratings over only the three free-to-air stations produced a higher average live rating of 3.6 percent and a higher average time shift rating of 0.07 percent. However, time shift viewing still only constituted two percent of total viewing.

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2. The figures that exclude multiple replays may contain time shifted programmes that were previously viewed by the individual while recording. It was not possible to exclude these programmes with the data available.

3. Analyses of programme ratings are based on five rather than six weeks, because programmes recorded in the sixth week had less than one week to be played back. By excluding week six, recordings had at least one week to be played back, which is the length of time within which a large majority of programmes are played back (Fiddick, 1984; Hunt, 1987; AGB McNair, 1991).

Considering that popular programmes or episodes typically achieve around 20 rating points, the average live rating reported in Table 17 appears to be very low. The majority of programmes in the sample had ratings under 0.5 and only one percent of the programmes had ratings over 20, this appears to be a representative distribution of live ratings for the following reasons. The programmes with ratings around 20 percent typically only appear on the free-to-air stations in prime time. Obviously there are many programmes that do not fall into this category and have much lower ratings. Furthermore, to be included in the analysis, programmes only had to be viewed by one panel member, which was the case for many early morning programmes. The introduction of 24-hour programming on all of the stations studied, except for Sky Movies, is likely to have increased the number of early morning programmes with very low ratings. In addition, the Sky TV stations have lower live audiences than the free-to-air stations.

The average time shift (VCR) rating, reported in Table 17, also seems very low (0.04). In some cases, however, VCR time shifting can increase a programme's live rating by one or two rating points. The implication of this is that these programmes have an additional 35,000 to 70,000 viewers (1% to 2% of the viewing population) who are not accounted for by live ratings. Table 18 presents the programmes from the sample which had VCR ratings greater than one.



**Table 18. Top VCR rating programmes**

Programme	Date	Start time	Station	Genre	VCR rating %	Live rating %	Total rating %	VCR rating contribution <sup>2</sup> %
Montana ST <sup>1</sup>	15 Sept	8.40pm	TVNZ1	Drama	2.1	17.5	19.6	10.6
Free Willy	15 Sept	8.30pm	TVNZ2	Movie	2.0	15.2	17.2	11.4
Montana ST <sup>1</sup>	22 Sept	8.40pm	TVNZ1	Drama	1.5	17.3	18.7	7.8
Cybill	10 Sept	8.30pm	TVNZ2	Comedy	1.4	12.8	14.2	10.2
The Topp Twins	5 Sept	7.30pm	TV3	Comedy	1.3	13.5	14.8	9.0
Montana ST <sup>1</sup>	1 Sept	8.35pm	TVNZ1	Drama	1.3	21.1	22.4	5.7
Montana ST <sup>1</sup>	8 Sept	8.35pm	TVNZ1	Drama	1.3	19.9	21.1	6.0
Coronation Street	2 Oct	7.30pm	TVNZ1	Soap	1.2	17.1	18.3	6.6
Montana ST <sup>1</sup>	29 Sept	8.40pm	TVNZ1	Drama	1.1	19.1	20.3	5.6
Inside N.Z.	12 Sept	8.30pm	TV3	Docume	1.1	11.9	13.0	8.4
Indecent Proposal	4 Sept	8.30pm	TVNZ2	Movie	1.1	12.5	13.5	7.7
The 3 Musketeers	22 Sept	8.30pm	TV3	Movie	1.1	10.0	11.0	9.5
Robin Hood	22 Sept	8.30pm	TVNZ2	Movie	1.0	10.3	11.3	9.1

1. Montana Sunday Theatre

2. VCR rating contribution = VCR rating / total rating. VCR rating contributions were calculated from figures with six decimal places.

The results in Table 18 suggest that some programmes can have very large time shift audiences. *Montana Sunday Theatre* achieved the highest VCR rating (2 rating points) when *Pride and Prejudice*, a six-part drama, screened. Since overnight ratings do not include VCR ratings, approximately 73,500 viewers<sup>4</sup> were not included in the rating of this episode. Previous research has also found that some programmes have much higher VCR ratings or time shift audiences than other programmes. For example, in the United Kingdom, Robbins (1995) found VCR ratings as high as 3.2 percent; and AGB Television (1995) found that 2.3 million time shift viewers watched *Wallace and Gromit*.

VCR rating contributions were also computed and presented in Table 18 to examine the proportion of the total audience not included in the overnight ratings. All of the VCR rating contributions in Table 18 were considerably higher than the average VCR rating contribution for all programmes (which was 2%, see Table 17). The highest VCR rating contribution was 11 percent for the movie *Free Willy*. Programmes with low live ratings can have much higher VCR rating contributions; the highest contribution over the sample period was 92 percent for a comedy, *All in the Family*, which screened at 5am on 3

4. Time shift viewers = VCR rating x population => 73,500 = 2.1% x 3,500,000

September. Previous research has also found higher VCR rating contributions for particular programmes. The top VCR rating programmes in the studies of AGB television (1995) and Mojo (1994) had VCR rating contributions between 22 and 24 percent. These results confirm that time shift viewing has a greater effect on the total audience of some programmes than others.

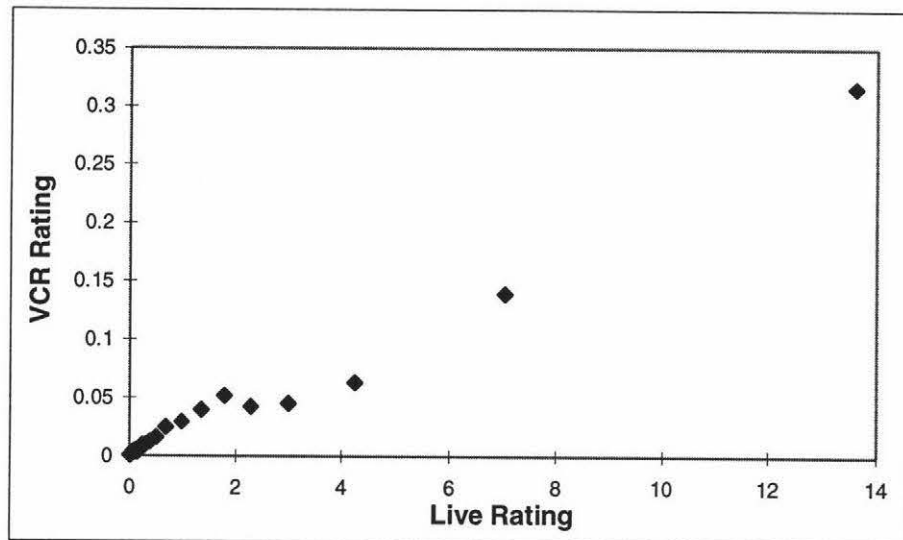
Further examination of the results in Table 18 revealed that many of the top VCR rating programmes were screened simultaneously. Robbins (1996) found similar results for two of the top twenty VCR rating programmes in November 1995. There do not seem to be any extensive studies on this issue. It seems likely that programme scheduling may have an influence on the VCR rating a programme will achieve.

Another interesting pattern in Table 18 is that the top VCR rating programmes all have live ratings of at least ten percent. Simple regression of VCR ratings against live ratings produced an  $R^2$  value of 0.35 ( $F = 2806$ , Signif.  $F < 0.0001$ ), which supports the positive relationship between the two variables: higher live rating programmes had higher VCR ratings by a factor of 1.79. Figure 7 represents these findings graphically. Programmes were sorted by their live rating, and the average live and VCR ratings were calculated for every 250 consecutive programmes<sup>5</sup>.

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5. Every 250 programmes were chosen to simplify the points on the graph, that is, rather than having 5,310 points representing each programme, means were calculated to produce approximately 20 points.

**Figure 7. VCR ratings versus live ratings**



Robbins (1996) also found that “*programme types which people choose to record automatically follow those programmes which would be most popular for ‘live’ viewing*” (p.15). However, earlier studies by Kirkham (1982) and Mojo (1994) reported that there was little correlation between live audiences and time shift audiences. Kirkham (1982) came to this conclusion after finding that the rank order of the top ten recorded programmes was not exactly the same as when they were ranked by their live rating. However, the top ten recorded programmes in his study all had reasonably high ratings of at least 13 percent. Mojo’s (1994) conclusion was also limited as it only compared the live ratings and recording levels of nine programmes.

Overall, time shift viewing represents a very small proportion of total viewing. However, the average VCR rating masks variations across individual programmes; for example, some programmes may have VCR ratings as high as two percent (which is equivalent to approximately 70,000 viewers), or time shift viewers may constitute up to 92 percent of total audiences. Although these are extreme cases, it seems important to include time shifting in the programme ratings to provide more accurate measures of programme audiences. The main constraint on this is that it is not possible to include all VCR playbacks in the overnight ratings. Previous research suggests that certain factors may influence time shift viewing levels; therefore, it may be possible to determine which

programmes will have higher VCR ratings. The following chapter examines variations in VCR ratings across programme genres, stations, times and days of the week, and across demographic characteristics of the live audience.

## CHAPTER 6. VARIATIONS IN TIME SHIFT VIEWING LEVELS: RESULTS AND DISCUSSION

The second stage of this study investigated variations in time shift viewing levels across different programme genres, stations, times and days of the week, and the dominant characteristics of the live audience. The objective of these analyses was to ascertain whether there is a relationship between these variables and the variations in VCR ratings<sup>1</sup>. This was investigated by comparing variations in VCR ratings and VCR rating contributions. VCR rating contributions are very similar to another measure developed later in this study to estimate VCR ratings, namely, “live correction factors”<sup>2</sup>. Due to the similarity in the measures, the variations in VCR rating contributions also gave an initial indication of whether any of the variables would be useful in estimating VCR ratings using live correction factors. Each of the variables is discussed in the following sections.

### 6.1 Time Shift Viewing across Programme Genres

Previous research has found that movies and soap operas have much higher proportions of time shift viewing than other programme genres (Arbitron, 1979; Levy, 1980; Agostino et al, 1980; Levy, 1981; Kirkham, 1982; Byington, 1983; Fiddick, 1984; Darkow, 1984; Singer, 1986; Gunter and Wober, 1989; Mojo, 1994; Robbins, 1996); while sports, documentaries, and children’s programmes have much lower proportions of time shift viewing (Levy, 1980; Kirkham, 1982; Byington, 1983; Darkow, 1984; Kaplan, 1985; Gunter and Wober, 1989; Fiddick, 1994; Robbins, 1996). These studies were based on levels of recording and playback rather than programme ratings; to date only one published study has investigated variations in VCR rating contributions across a few programme genres (Warrens and Thompson, 1992).

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1. As this study was based on non-experimental data, it is not possible to determine whether the relationships are causal, that is, whether the variables cause variations in VCR ratings.

2. The similarities of the measures is explained in chapter seven and in Appendix A.

To investigate variations in VCR ratings across programme genres, live ratings and VCR ratings for programmes broadcast on free-to-air stations<sup>3</sup> over a five week period were averaged for ten programme genres<sup>4</sup>. Table 19 reports the average live rating, the average VCR rating, and the contribution of VCR ratings to total ratings for each programme genre. VCR rating contributions estimate the relative effect of VCR ratings on total ratings<sup>5</sup>. For example, if two programmes both had a VCR rating of one, but the first programme had a live rating of 20 and the second had a live rating of two, obviously the VCR rating would have a greater effect on the total rating of the latter programme. Since the effect of programme ratings is not determined by the VCR rating alone, it is important to also compare VCR rating contributions.

**Table 19. Ratings by programme genres**

Genre <sup>1</sup>	Average Live Rating	Average VCR Rating	VCR rating Contribution <sup>2</sup>
	%	%	%
Movies & mini-series	4.2	0.25	5.5
Drama	4.4	0.16	3.5
Soap	4.4	0.13	2.8
Documentary	4.2	0.10	2.3
Comedy	4.4	0.08	1.9
Sport	5.3	0.08	1.4
Current Affairs	4.4	0.05	1.2
Children's	1.9	0.02	1.1
News	8.4	0.07	0.8
Other	1.7	0.02	1.4

1. The number of cases in each genre are presented in Appendix D.

2. VCR rating contribution = Genre's VCR rating / (Genre's VCR rating + Genre's Live rating)

3. Sky TV (pay TV) stations were not included in the calculation of programme genre ratings, because these stations typically have smaller audiences and most of them are specialist stations, that is, Sky Movies, Sky Sport and Sky News. Including the lower rating programmes of these sky TV stations would have distorted the movies, sport and news genres.

4. The genres were based on the 28 programme genres as defined by AGB McNair. The live ratings and VCR ratings were firstly compared for all 28 genres and then similar genres were combined.

5. Unless otherwise stated, the VCR rating contributions calculated in this chapter were based on the second measure described in Appendix A.

The VCR ratings reported in Table 19 are an estimate of the average proportion of the population who view each programme genre via time shifting. Movies & mini-series, dramas, and soap operas had larger average time shift audiences compared to the other genres in this study. In fact, movies and mini-series had a much higher VCR rating (0.25%) than the overall average (0.04%). As previously mentioned, many other researchers have also found that movies and soap operas have higher levels of time shift viewing, however, fewer researchers have found that dramas have high levels of time shift viewing (Fiddick, 1984; Gunter and Wober, 1989; Robbins, 1996).

In contrast, children's and "other" programmes had smaller time shift audiences compared to the other genres, as also found in other studies (Byington, 1983; Kaplan, 1985; Robbins, 1996). However, unlike this study, many studies found that sports programmes and documentaries also had low levels of time shift viewing (Levy, 1980; Agostino et al, 1980; Levy, 1981; Kirkham, 1982; Byington, 1983; Fiddick, 1984; Darkow, 1984; Kaplan, 1985; Robbins, 1996). Considering that these studies are based on overseas research, perhaps New Zealanders have different viewing habits for sports and documentaries compared to other countries.

The *VCR rating contributions* presented in Table 19 show that time shift viewing had the greatest effect on the ratings of the movies and mini-series genre; on average, six percent of the total rating for movies and mini-series consisted of time shift viewing. Like the rankings of the VCR ratings of the genres, dramas and soap operas had the next highest VCR rating contributions. Generally, as the VCR ratings of the genres increased so did their VCR rating contributions. This pattern appears to be a type of double jeopardy, that is, the genres with higher VCR ratings not only had larger time shift audiences, but the effect of time shift audiences on total audiences was also greater. Therefore, the estimation of VCR ratings seems to be even more important for programmes in genres with high VCR ratings; particularly the movies and mini-series genre.

At the aggregate level, earlier results found that VCR ratings increased as live ratings increased. This pattern suggests that genres with high live rating programmes will also have high VCR ratings. However, this pattern was not evident in Table 19, suggesting that within programme genres there are different underlying patterns compared to the aggregate level.

Considering that there does appear to be a relationship between programme genres and variations in VCR rating contributions, and that across genres there are patterns that are not apparent at the aggregate level, live correction factors based on programme genres may provide a useful method of estimating VCR ratings.

## **6.2 Time Shift Viewing across Stations**

Previous research has found that programmes are more likely to be time shifted if they are broadcast on stations with higher live audiences (Kirkham, 1982; AGB McNair, 1991; Mojo, 1994; Robbins, 1996). To date, research has not compared VCR ratings across stations; these details are needed to estimate whether the proportions of programme audiences not included in the current ratings differ across stations.

Seven stations were investigated in this study; three national free-to-air stations: TVNZ1, TVNZ2 and TV3; and four pay television stations: Sky Movies, Sky Sport, Sky Orange, and Sky News. Live ratings and VCR ratings were averaged from the ratings of programmes screened on each station across five weeks - the results are presented in Table 20.



**Table 20. Ratings by stations**

Station <sup>1</sup>	Average Live Rating %	Average VCR Rating %	VCR rating Contribution <sup>2</sup> %
Sky Sport	0.3	0.01	2.8
Sky Movies	0.4	0.01	2.8
TV3	2.4	0.05	2.2
TVNZ2	3.3	0.07	2.1
Sky Orange	0.2	<0.01	2.0
TVNZ1	5.5	0.10	1.9
Sky News	0.1	0.00	0.0

1. The number of cases in each genre are presented in Appendix D.

2. VCR rating contribution = Station's VCR rating / (Station's VCR rating + Station's Live rating)

In this study, TVNZ1 had the highest average live and time shift ratings, whereas Sky News had the lowest live rating and no time shift viewing. Table 20 confirms the pattern noted in earlier research that stations with higher live audiences (live ratings) also have higher time shift audiences (VCR ratings). For example, at the time of AGB McNair's (1991) study, TVNZ2 (rather than TVNZ1) had the highest live viewing shares of the three free-to-air stations, and also the highest level of playback. This pattern seems to reflect the aggregate pattern found in section 6.2, that higher live rating programmes have higher VCR ratings; that is, stations with higher live rating programmes will also have higher VCR ratings. This suggests that the categorisation of programmes by stations does not increase the understanding of variations in VCR ratings. To further explore time shift viewing variations across stations, the study also compared VCR rating contributions.

The VCR rating contributions in Table 20 suggest that VCR ratings have a slightly greater effect on the total ratings of programmes broadcast on Sky Sport and Sky Movies than on other stations, even though they had much lower average live and VCR ratings than the free-to-air stations. The high average VCR rating contribution of Sky Movies seems logical considering that this study previously found that the movie and mini-series genre had the highest average VCR rating contribution across the programme genres (section 6.1). However, this does not explain why Sky Sport had high VCR

rating contributions; a possible explanation is that since Sky Sport often has exclusive rights to screen live sports events, these programmes may be more likely to be time shifted than sports programmes on other stations.

The free-to-air stations: TVNZ1, TVNZ2, and TV3, and Sky Orange had similar VCR rating contributions. This suggests that across the free-to-air stations the effect of VCR ratings on total programme ratings will not be influenced by the station on which the programme is broadcast. The similarity of the VCR rating contributions of these stations may be due to the previously mentioned correlation between live and VCR ratings. That is, if the live ratings of stations increased as the VCR ratings of stations increased, theoretically the effect of VCR ratings would stay constant. The similarity of the VCR rating contributions across free-to-air stations provides little assistance for estimating variations in the VCR ratings of free-to-air programmes.

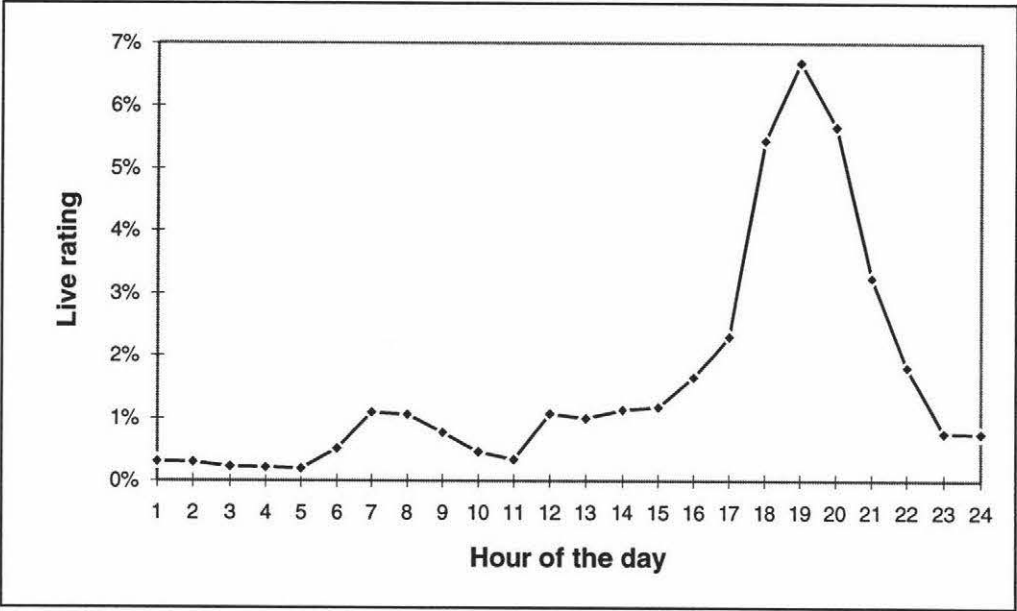
Lastly, of the 625 programmes that were viewed live on Sky News over the five weeks, none were time shifted. This suggests that VCR ratings should not be estimated for programmes that appear on this station.

### **6.3 Time Shift Viewing across Times of the Day**

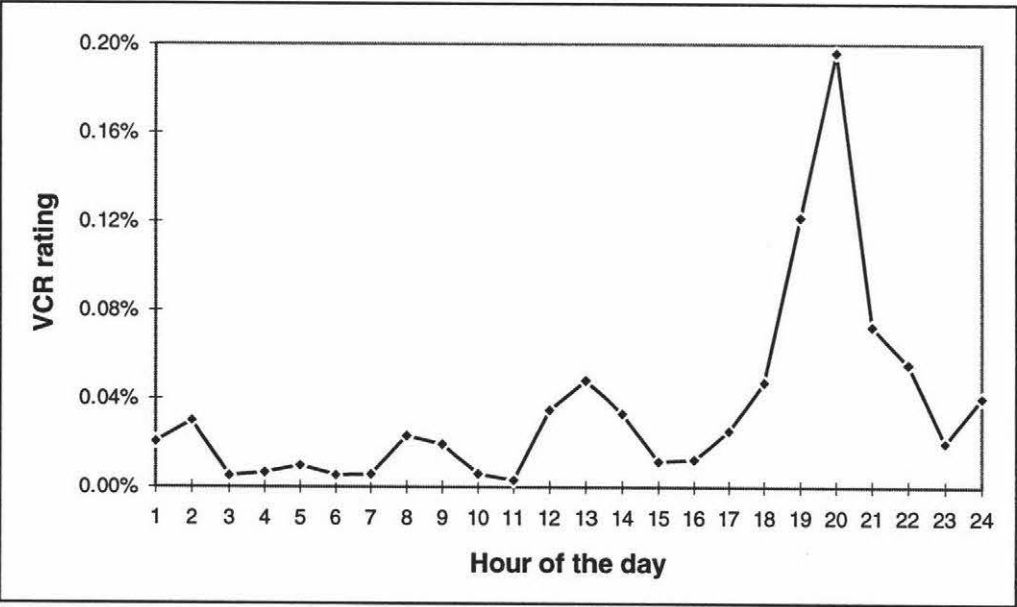
Previous researchers found that recording levels across times of the day generally followed live viewing levels, with the majority of recordings occurring in prime time (Agostino et al, 1980; Levy, 1980; Metzger, 1986; Mojo, 1994; Robbins, 1996; Jones, 1996). However, recording levels are not the best measure of time shifting as not all recordings are played back. This study compared the VCR ratings (which are based on playback) of programmes which were broadcast at different hours of the day, to investigate whether the time of day that a programme is broadcast influences VCR rating contributions.

Live ratings, VCR ratings, and VCR rating contributions of programmes were averaged for each hour of the day, across 35 days (5 weeks), for seven stations. Programme ratings were allocated to an hour based on programme start times, that is, if a programme started at 7:30pm and finished at 8.30pm its ratings would be allocated to the hour beginning at 7pm. The variations in live ratings and VCR ratings across 24 hours are presented in Figures 8 and 9.

**Figure 8.      Live ratings across hours of the day**



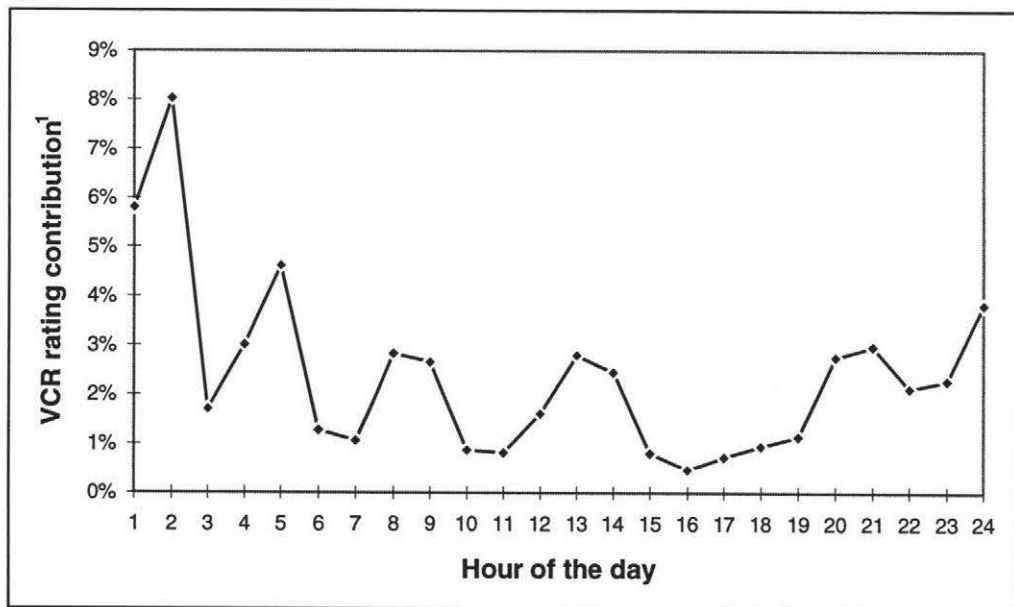
**Figure 9.      VCR ratings across hours of the day**



Live and VCR ratings followed similar patterns throughout the day, with the highest ratings occurring between 6pm and 9pm. The main discrepancies were the increase in VCR ratings at 2am when live ratings remained constant, and the dip in VCR ratings between 2pm and 5pm when live ratings were increasing. The overall patterns are consistent with the findings from previous research, that is, time shift viewing across the day follows patterns of live viewing, with the majority of both types of viewing occurring in prime time. This pattern appears to reflect the correlation of live programme ratings and VCR programme ratings, which was discussed in section 5.2.

Since live ratings increased with VCR ratings across hours of the day, the contribution of VCR ratings to total ratings was unlikely to significantly vary. However, as shown in Figure 10, VCR rating contributions did appear to vary across hours of the day.

**Figure 10. VCR rating contributions across hours of the day**



1. VCR rating contribution =  $\text{Mean} \left( \frac{\text{Programme VCR rating}}{\text{Programme VCR rating} + \text{Programme Live rating}} \right)^6$

6. The results in Figure 11 are based on the first method of calculating VCR rating contributions (see Appendix A). VCR rating contributions were also compared across hours of the day using the second method of calculation; the results were very similar to the results of the first method.

The pattern in Figure 10 is very erratic, especially during the early morning hours. The large variations between hours suggests that the variations may be due to other factors. For example, the drop in VCR rating contributions between 2am and 3am suggests that programmes broadcast at 2am have higher VCR rating contributions than programmes screened at the latter time, however, it seems that the high ratings at 2am were instead due to programme scheduling. That is, of the 79 programmes screened at 2am, 23 were episodes of "The Beverly Hillbillies" which all had VCR rating contributions greater than the average (0.08%). Since there are very small live audiences in the early morning, popular programmes broadcast during this time are able to achieve very high VCR rating contributions. It seems that during the early morning, the popularity of the programmes screened is more likely to cause variations in hourly VCR rating contributions, rather than the actual hour in which the programmes are broadcast.

The VCR rating contributions appear to be less erratic between the hours of 3pm and 11pm, when live audiences are larger. During this time it seems that programmes broadcast between 8pm and midnight had higher VCR rating contributions than those broadcast between 3pm and 8pm by a difference of 1.5%. Further analysis found that the difference in these time periods was significant (at the 0.05% level).

Overall, it seems that hour of the day will provide little assistance in estimating variations in the VCR ratings, because the VCR rating contributions across stations only varied by 1.5% between 6am and 11pm, and because the variations in VCR rating contributions in the early morning are most likely due to programme scheduling.

## **6.4 Time Shift Viewing across Days of the Week**

Previous researchers found that programmes broadcast on weekends are more likely to be time shifted than programmes that are broadcast during the week (Kirkham, 1982; Metzger, 1986; Sims, 1989; AGB McNair, 1991; Mojo, 1994). Their findings were

again based on levels of recording, so it is not known how many of the recordings were played back. This study used VCR playback to calculate and compare live ratings, VCR ratings, and VCR rating contributions for weekdays and weekends (see Table 21). Programme ratings were averaged over five weeks for programmes broadcast on free-to-air stations.

**Table 21. Ratings for weekdays versus weekends**

Days	Average Live Rating %	Average VCR Rating %	VCR rating Contribution <sup>1</sup> %
Week	3.5	0.07	2.0
Weekend	3.9	0.09	2.2

1. VCR rating contribution = Average VCR rating / (Average VCR rating + Average Live rating)

Table 21 supports the findings of previous research, that is, live ratings and VCR ratings were significantly<sup>7</sup> higher for weekend programmes than for weekday programmes. In addition, the effect of VCR ratings on programme ratings was slightly higher for weekend programmes. To examine the variations more closely, this study also compared average programmes ratings across each day of the week - as presented in Table 22.

**Table 22. Ratings by day of the week**

Day of the week <sup>1</sup>	Average Live Rating %	Average VCR Rating %	VCR rating Contribution <sup>2</sup> %
Sunday	4.4	0.10	2.3
Tuesday	3.6	0.08	2.2
Saturday	3.5	0.07	2.1
Monday	3.9	0.08	2.0
Wednesday	3.4	0.07	1.9
Thursday	3.5	0.07	1.9
Friday	3.0	0.06	1.8

1. The number of cases in each genre are presented in Appendix D.

2. VCR rating contribution = Average VCR rating / (Average VCR rating + Average Live rating)

7. Weekday and weekend live ratings were significantly different ( $F = 4.00$ , Signif.  $> 0.05$ ). Weekday and weekend VCR ratings were also significantly different ( $F = 6.99$ , Signif.  $> 0.05$ ).

Previous research, which measured recorded minutes across days of the week, found that Sundays had the highest level of recording (Sims, 1989; AGB McNair, 1991). The results in Table 22 supports earlier findings by confirming that programmes have higher time shift audiences (or levels of playback) if they are recorded on Sundays.

As well as having the highest VCR ratings, programmes that screened on Sundays also had the highest average live ratings and VCR rating contributions; in contrast, Fridays had the lowest average live ratings, VCR ratings and VCR rating contributions. This pattern suggests that although the VCR ratings for the rest of the days were very similar, the double jeopardy phenomenon may exist across days of the week. That is, Sunday programmes had higher time shift audiences than programmes broadcast on Fridays, and the effect of time shifting on programme ratings was also greater for Sunday programmes.

Even though this study and previous studies have found that VCR ratings are higher for programmes broadcast on Sundays, the average VCR rating contribution is only 0.5 percent higher than the average for programmes screened on Fridays. That is, the effect of VCR ratings on total ratings does not greatly vary across days of the week, thus the day of the week that a programme is broadcast is likely to be a poor predictor of variations in VCR ratings.

## **6.5 Time Shift Viewing across Demographic Groups**

Previous research found that programmes are more likely to be time shifted by women or people aged 50 plus (Jones, 1996); this finding was also suggested by earlier results in this study (see section 5.1). Previous research has not investigated the effect these demographic groups have on the time shift ratings of programmes.



In order to calculate average live ratings, VCR ratings, and VCR rating contributions for different demographic groups, the live audiences of programme episodes were firstly categorised into dominant gender and age groups. Programmes were classified as having a predominantly male audience if over 60 percent of the programme audience were male, or predominantly female if over 60 percent of the audience were female, otherwise programmes were classified as mixed gender. Four age groups were used: 5 - 19, 20 - 34, 35 - 49, and 50 plus; the dominant age group for a programme was calculated using modes. Ratings for the demographic groups were then calculated by averaging the ratings of all programmes viewed predominantly by the particular demographic group. For example, average ratings for the 50 plus age group were calculated by averaging the ratings of programmes viewed predominantly by people aged 50 or over - Table 23 contains the results.

**Table 23. Ratings by dominant demographic groups**

Programme demographics <sup>1</sup>	Average Live Rating %	Average VCR Rating %	VCR rating Contribution <sup>2</sup> %
<i>Gender</i>			
Mixed audience	2.7	0.08	2.1
Male majority	0.2	0.01	2.0
Female majority	1.7	0.03	1.9
<i>Age</i>			
35-49	0.7	0.03	4.0
20-34	1.3	0.04	3.0
50+	3.7	0.07	1.9
5-19	1.8	0.02	1.0

1. The number of cases in each genre are presented in Appendix D.

2. VCR rating contribution = Average VCR rating / (Average VCR rating + Average Live rating)

Programmes which had predominantly female audiences had marginally larger time shift audiences than programmes with predominantly male audiences. Previous research also found that females were more likely to time shift programmes than males (Sims, 1989; Lindstrom, 1989; Gunter and Wober, 1989; Robbins, 1996). Programmes with mixed gender audiences, however, had higher live and VCR ratings than programmes viewed predominantly by males or females. The results in Figure 23 show that, like the



aggregate trend, VCR ratings of the gender groups increased as live ratings increased. This pattern provides the likely explanation for the similarity of the VCR rating contributions. Since the VCR rating contributions for the gender groups were so similar, the dominant gender of the live audience is unlikely to provide any assistance to the estimation of VCR ratings.

Across age groups, programmes which were predominantly viewed by people aged 50 and over had higher VCR ratings than other programmes (see Table 23); this confirmed the findings of Jones (1996). However, the programmes that were viewed predominantly by people aged 50 plus also had very high average live ratings, and as a result did not have the highest VCR rating contribution compared to other age groups. Instead, VCR ratings had the greatest effect on the total ratings of programmes viewed by the 35-49 age group. The variations in VCR rating contributions across age groups suggests that live correction factors based on the dominant age group of a programme's live audience may be useful in estimating variations in VCR ratings.

To summarise the findings of this chapter, there were reasonably large variations in VCR rating contributions across programme genres and dominant age groups, thus these variables may be good predictors of variations in VCR ratings. Section 7.2.3 in the following chapter calculates and compares live correction factors across programme genres and dominant age groups, to investigate the possibility of estimating VCR ratings overnight.

## **CHAPTER 7. MEASURING TIME SHIFT VIEWING: RESULTS AND DISCUSSION**

The third stage of this study investigated time shift viewing measures, that is, methods of calculating VCR ratings. The first section investigated issues relating to the current calculation of VCR ratings, and the second section explored possible methods of estimating VCR ratings overnight.

### **7.1 Current Measures**

At present, the calculation of VCR ratings is either based on VCR playback or VCR recording. To investigate these measures this study replicated previous research, in order to compare levels of recording and playback (section 7.1.1) and examine the viewing lags of programmes (section 7.1.2).

#### **7.1.1 Levels of Recording and Playback**

Rating companies use either VCR recording or VCR playback to measure time shifting behaviour<sup>1</sup>. The advantage of methodologies which document VCR recordings is that time shift viewing can be included in the overnight ratings. However, this method assumes that all recordings are played back, and research has found that the level of VCR recording is typically much higher than the level of playback (Levy, 1981; Stoessl, 1982; Levy, 1983; Hunt, 1987; Sims, 1989; AGB McNair, 1991; Warrens and Thompson, 1992; Mojo, 1994), thus seriously questioning the validity of VCR recording as an estimate of time shifting behaviour. By contrast, VCR playback is a more logical and

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1. AGB rating companies calculate time shift ratings from VCR playback, whereas A.C. Nielsen rating companies use VCR recording.

direct measure of time shifting behaviour. However, it is not possible to include this measure in the overnight ratings.

To further investigate the use of VCR recording as an estimate of time shift viewing, this study compared the average number of programmes recorded by households per week to the average number played back per week<sup>2</sup> over six weeks. On average, households recorded 4.3 programmes and played back 2.1 programmes per week; that is, there were two recordings for every playback. This supports previous findings that more broadcasts are recorded than played back, and confirms that time shift ratings estimated from VCR recording overestimate time shift audiences.

Previous estimates of the proportion of recordings played back vary. Levy (1983), for example, found that a higher proportion of recordings were played back. He estimated that the average VCR household recorded 3.3 programmes a week and played back 2.4 programmes a week; that is, there were 1.4 recordings for every playback. However, Levy's (1983) study was conducted when VCRs were first introduced and were still a novelty; consequently viewers may have been more likely to playback recordings at this time.

A recent New Zealand study found a lower proportion of recordings played back, compared to the results in this thesis. AGB McNair (1991) found that, on average, individuals recorded 87 minutes of television in a week but only 29 of those minutes were played back within 28 days; that is, there were three recorded minutes for every minute played back. The difference in the results found in this thesis and the findings of AGB McNair (1991) may be partly due to the different measures used. This thesis measured the number of programmes recorded and played back; whereas AGB McNair's (1991) study measured the number of minutes. In addition, AGB McNair's (1991) estimates of recording and playback appear to be more conservative than the estimates in this study, because their study did not count minutes that were zipped during playback,

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2. Excluding multiple playbacks within the household.

whereas this study counted programmes even if only part of the programme was recorded or played back<sup>3</sup>. Both studies have found, however, that many more programmes or minutes are recorded than played back.

Previous research has also found that the proportion of recordings played back varies across individual programmes (Mojo, 1994). To investigate whether there are stable variations across programme genres, the average number of recordings and playbacks per week were calculated for nine programme genres (see Table 24).

**Table 24. Average number of programmes recorded and played back by households per week by programme genres**

Genre	Average recordings per week	Average playbacks per week <sup>1</sup>	Ratio (recording : playback)
Soap operas	0.37	0.22	1.7 : 1
Children's	0.18	0.10	1.8 : 1
Documentary	0.40	0.23	1.8 : 1
Movies & Mini-series	0.62	0.33	1.9 : 1
Drama	0.77	0.41	1.9 : 1
Comedy	0.47	0.23	2.1 : 1
News & Current affairs	0.77	0.30	2.6 : 1
Sport	0.28	0.10	2.7 : 1
Other	0.42	0.19	2.2 : 1

1. Including only the first playback of a recording within the household.

Sports programmes had the highest ratio of recording to playback; for every programme played back there were 2.7 programmes recorded; whereas soap operas had the lowest ratio, with 1.7 recordings for each playback. Soap operas may have high playback rates, because recordings of soaps are likely to be watched before the next episode screens rather than stored for later use and then forgotten. In contrast, information about sport and current events is available from other sources (for example, radio and newspapers), and so this may make recordings of this sort redundant.

3. Only the first playback of a recording was counted, multiple replays were not included.

On average, viewers record twice as many programmes as they play back; however, the proportion of recordings played back varies across programme genres. Therefore, rating services that base time shift ratings on recordings rather than playback not only overestimate the audience, but some programme genres are overestimated slightly more than others. For this reason, VCR ratings in New Zealand are based on playback<sup>4</sup>. A limitation of this measure is that time shift viewing levels can not be included in the overnight ratings. The following section explores the time delay between recording and playback, before exploring other methods of estimating VCR ratings.

### 7.1.2 The “Viewing Lag”

The results from the previous section suggest that VCR ratings should be based on the level of playback rather than the level of recording, since the latter seriously overestimates time shift audiences. If VCR ratings are based on playback, rating services must know the time frame within which the majority of playbacks are viewed, as it will not be until after this period that any VCR ratings can be released.

To calculate the delay in time shift viewing, programmes that were recorded within a two-week period between the 26 August and 9 September were studied. A total of 3615 programmes were recorded over the two weeks and, of these programmes, 1737 (48%) were played back within 28 days from the day of recording. That is, 48 percent of the programmes recorded within the two-week period were played back within 28 days<sup>5</sup>. Analysis of the delay between recording and playback was based on the 1737 programmes (or 48%) that were played back within 28 days from recording<sup>6</sup>. Table 25 presents the results from this analysis and also reports the proportion of recordings played back over 28 days.

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4. In this thesis, measures of time shift viewing were also based on VCR playback, rather than VCR recording.

5. Programmes were given 28 days from the day of recording to be played back because it is the longest time period that the data would allow. A problem with this and other studies is that the final proportion of recordings played back is unknown, although it does seem that a large proportion of programmes are played back within four weeks.

6. Only the first playback of programmes by individuals were counted, multiple playbacks were excluded.

**Table 25. Delay between recording and playback over 28 days**

Replay delay Days	Proportions of playbacks		Proportion of recordings	
	%	Cumulative %	%	Cumulative %
0	40	40	19	19
1	29	69	14	33
2	9	78	4	37
3	4	82	2	39
4	3	85	1	41
5	3	87	1	42
6	2	89	1	43
7	2	91	1	44
8-14	6	97	3	47
15-21	2	99	1	48
22-28	1	100	<1	48

Average lag = 2.3 days

Table 25 shows that a large proportion of playbacks (40%) were viewed on the day that they were recorded, and nearly all playbacks (91%) were viewed within 7 days. These results are similar to Hunt's (1987) findings; specifically, he found that 60 percent of playbacks occurred on the same day or the day after recording, and 99 percent of playbacks were played within one week of recording.

In contrast, AGB McNair (1991) found that only 75 percent of playbacks were played within one week. This was a lower proportion than the proportions found in this study and Hunt's (1987) study, because the programmes in the latter studies had 28 days to be played back whereas the programmes in AGB McNair's study had many months, even years, to be played back. In addition, it is unclear whether AGB McNair's study included multiple playbacks by individuals, if so, this would have increased the number of programmes played back at later dates.

Table 25 also shows that 48 percent of recordings played back of 28 days. This proportion is very close to the ratio (2 recordings:1 playback) found in section 7.1,

which compared the average number of programmes recorded and played back per week. This suggests that there would be very few playbacks after 28 days and provides support for the estimated proportion of playbacks that occurred over one week. So, to summarise the New Zealand research to date, it seems that between 75 and 90 percent of playbacks occur within one week.

As this study and previous research has found that most programmes are played back within seven days of recording, this time period seems satisfactory to estimate time shift audiences and calculate VCR ratings. A time period longer than seven days would gain only an additional small proportion of playbacks, which would not justify the delay in the release of VCR ratings. A time period shorter than seven days, but longer than two days, would still include a large proportion of playbacks. The time period that rating services employ depends largely on the urgency of their data requirements.

To further investigate the delay between recording and playback, variations in playback behaviour across programme genres were examined. The results were based on the 1737 programmes replayed within 28 days of the day of recording; for each genre the study calculated the proportion of playbacks that occurred on the day of recording, one day after recording, two days after recording, and three to seven days after recording. The results are presented in Figure 11; the genres are sorted by the proportion of programmes played back on the day of recording.



**Figure 11. Cumulative proportions of programmes played back over 28 days by programme genres<sup>7</sup>**

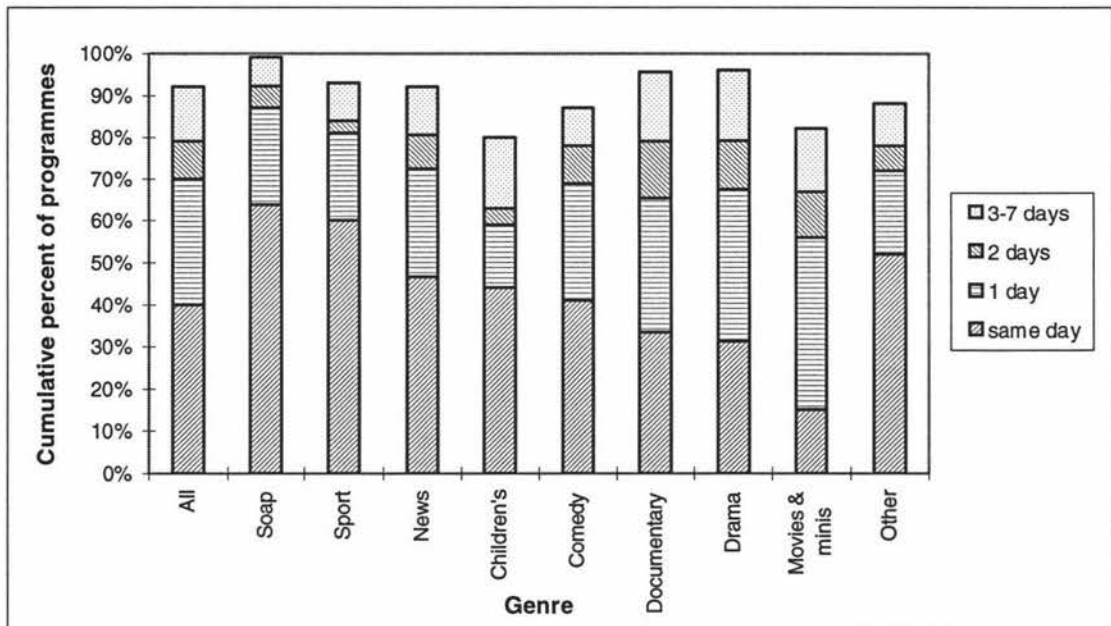


Figure 11 shows that the proportion of programmes played back over time varied across programme genres. The majority of playbacks within the soap opera, sport and other programme genres were played on the same day that the programme was broadcast. In comparison, only 15 percent of movies & mini series were played back on the same day of recording. The most obvious explanation of this latter finding is that the majority of movies and mini-series are likely to be taped late in the evening, thereby leaving limited time for them to be played back on the same day. On the day after recording, a large proportion of movies and mini-series were played back, although the total proportion of programmes played over this time is still smaller than for other genres.

Soap operas had the highest proportion of playbacks within one week, with 98 percent of playbacks occurring in this period. Children's programmes and the movies and mini-series genre had the lowest proportion of programmes played back within one week. Previous research also found that soap operas were played back sooner than other programme genres, whereas movies had longer viewing lags when compared with other

7. The percentages that Figure 7 represents are presented in Appendix C.



genres (Levy, 1981; Levy, 1983; Fiddick, 1984; Mojo, 1994). Thus, depending on the viewing lag used to quantify time shift audiences, some genres will have higher proportions of playbacks viewed than other genres.

## **7.2 Estimating VCR Ratings**

Ideally, rating services would be able to include actual time shift audiences in the overnight ratings; this is not possible due to the viewing lags of time shifted programmes. Since the reported programme ratings in New Zealand may be underestimated by up to one or two rating points (that is, approximately 50,000 viewers), this raises the question of whether it is possible to accurately estimate VCR ratings and include them in the overnight ratings. In the United States, A.C. Nielsen estimate VCR ratings from recordings; however, as previously discussed, ratings estimated in this way seriously overestimate time shift audiences.

This chapter explores four methods of estimating VCR ratings overnight. Three of the methods were developed from earlier results presented in this study, and the fourth method attempts to model VCR ratings.

### **7.2.1 Recording Level Adjustment Method**

The first method of estimating VCR ratings overnight involves adjusting VCR recording levels by recording:playback correction factors. Section 7.1.1 found that levels of recording and playback vary across programme genres. For example, soap operas had a recording:playback ratio of 1.7 recordings to one playback, whereas sports programmes had a recording:playback ratio of 2.7 recordings to one playback. If these ratios are confirmed by subsequent studies (that is, are stable) they could be used to adjust programme VCR recording levels, and thereby include estimates of time shift audiences in the overnight ratings.

To adjust recording levels, the recording:playback ratios reported in Table 24 were converted to percentages; these percentages were named recording:playback factors and are presented in Table 26.

**Table 26. Programme genre recording : playback factors**

Genre	Recording : playback ratio	Recording: playback factor %
Soap operas	1.7 : 1	59
Children's	1.8 : 1	56
Documentary	1.8 : 1	56
Movies & Mini-series	1.9 : 1	53
Drama	1.9 : 1	53
Comedy	2.1 : 1	48
News & Current affairs	2.6 : 1	39
Sport	2.7 : 1	37
Other	2.2 : 1	45

The recording:playback factors presented in Table 26 could be used to calculate VCR ratings in two ways producing similar results. The first method involves multiplying VCR ratings based on recordings by the appropriate recording:playback factor. The second method involves selecting a proportion of programme recordings and then calculating VCR ratings; the proportion selected would be equivalent to the genre recording:playback factor.

The current method of estimating VCR ratings overnight is based on unadjusted VCR recording. Since the recording level adjustment method attempts to exclude recordings that are not played back, it is likely to provide more accurate estimates of VCR ratings than those using unadjusted VCR recording.

### 7.2.2 Same Day Playback Adjustment Method

The second proposed method of estimating VCR ratings overnight involves adjusting same day playbacks by viewing lag multipliers. Section 7.1.2 found that the majority of playback for some programme genres occurs very quickly. For example, of the soap operas that were played back within 28 days of recording, 64 percent occurred on the day of recording, and of the sports programmes that were played back within 28 days of recording, 60 percent occurred on the day of recording. If these proportions are confirmed by subsequent studies, they could be used to adjust same day playbacks of programmes, and thereby include estimates of time shift audiences in the overnight ratings.

To adjust same day playback levels and allow for later playbacks, genre viewing lag multipliers were calculated from the average proportions of same day playbacks for each genre. The viewing lag multipliers for the genres are presented in Table 27.

**Table 27. Programme genre viewing lag multipliers**

Genre	Same day playbacks <sup>1</sup>	Viewing lag multipliers
	%	
Soap operas	64	1.6
Sport	60	1.7
News & Current affairs	47	2.1
Children's	44	2.3
Comedy	41	2.4
Documentary	34	2.9
Drama	31	3.2
Movies & Mini-series	15	6.7
Other	52	1.9

1. The proportion of playbacks which were played on the day of recording.

To estimate time shift audiences, VCR ratings would be calculated from the playbacks that occurred on the day that the programme was broadcast, and then multiplied by the appropriate viewing lag multiplier.

This study assumes that programmes within a programme genre have similar viewing lags, that is, that the aggregate viewing lags for programme genres are similar to the viewing lags for individual programmes. For example, although 64 percent of soap opera playbacks occurred on the day of recording, this does not necessarily mean that 64 percent of the playbacks of an episode of *Days of Our Lives* will occur on the day of recording.

If the genre viewing lags are stable across and within the genres, the same day playback adjustment method is likely to provide more accurate estimates of time shift audiences than the current method of estimating VCR ratings overnight, which is based on unadjusted recording.

### **7.2.3 Genre/Station Correction Method**

The third method of estimating VCR ratings overnight proposes using live ratings as a base and adjusting them by live correction factors. Live correction factors are calculated by dividing VCR ratings by live ratings. Live correction factors were used to correct live ratings because they account for the live rating of programmes and can directly calculate VCR ratings from live ratings<sup>8</sup>.

Live correction factors are very similar to VCR rating contributions, which were calculated in chapter six; VCR rating contributions are calculated by dividing VCR ratings by total ratings. The findings of chapter six suggested that programme genres and the dominant age group of the live audience may be useful in estimating VCR ratings, because there were large variations in VCR rating contributions across these variables. The remainder of this section investigates of the possibility of estimating VCR

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8. Further discussion on live correction factors is contained in Appendix A.

ratings based on variations in live correction factors across dominant age groups and programme genres.

The dominant age groups of the live audience consisted of male dominant live audiences, female dominant live audiences, and mixed live audiences. Live correction factors were calculated and compared across these groups, but they were not significantly different at the 0.05 level, and as a result would provide little assistance in estimating variations in VCR ratings. The variations in VCR rating contributions across dominant age groups reported in chapter six appeared to show variations across these groups, but the variations could not be tested for significance due to the method of calculation (see Appendix A). It seems that the variations in VCR rating contributions are unlikely to be significant.

This study did find significant differences in the live correction factors calculated across programme genres - Table 28 presents the live correction factors.

**Table 28. Ratings by programme genres**

Genre <sup>1</sup>	Average Live Rating %	Average VCR Rating %	Live Correction Factor <sup>2,3</sup> %
Comedy	4.4	0.08	9.4
Movies & mini-series	4.2	0.25	8.6
News	8.4	0.07	5.7
Drama	4.4	0.16	4.4
Documentary	4.2	0.10	3.1
Soap	4.4	0.13	3.0
Sport	5.3	0.08	2.9
Children's	1.9	0.02	1.8
Current Affairs	4.4	0.05	1.6
Other	1.7	0.02	2.4

1. The number of cases in each genre are presented in Appendix D.

2. Correction factor = Mean (Programme's VCR rating / Programme's Live rating)

3. See appendix E for a multiple comparison test of the means.

The live correction factors were ranked slightly differently than the VCR rating contributions reported in chapter 7. For example, the movies and mini-series genre had the highest VCR rating contribution, but, as shown in Table 28, comedies had the highest live correction factor. In addition, the news genre had a unexpectedly high VCR rating correction factor. The difference in the rankings of programme genres reported by live correction factors compared to VCR rating contributions are due to the different methods of calculating averages, as described in Appendix A. One method diminishes the effect of extreme values on the mean (this was the method used to calculate VCR rating contributions), whereas the other method increases the effect of extreme values on the mean (this was the method used to calculate live correction factors). The latter method is useful for identifying underlying patterns in the variables; underlying patterns are present if the live correction factors are unexpectedly high.

The high live correction factors of the comedy and news genres should be interpreted with caution, because these genres had high and low VCR ratings and, therefore, it seems that these genres should have low live correction factors. Further analysis revealed underlying patterns in the VCR correction factors of these genres, due to the effect of other variables. For example, the news genre had much higher live correction factors on TVNZ1 than on TV3, which greatly increased the average live correction factor of this genre.

To further investigate the patterns within programme genres, live correction factors for each genre were compared across stations. In the analysis only free-to-air stations were included, as the Sky TV stations typically only screen programmes from one genre, for example, Sky movies only screens movies. The correction factors are presented in Table 29, the figures in bold are the highest live correction factors for each programme genre.

**Table 29. Live correction factors: genre by station**

Genre	TVNZ2	TVNZ1	TV3	Mean <sup>1</sup>
	%	%	%	%
Comedy	<b>14.4</b>	1.4	3.2	9.4
Movies & Mini series	<b>11.0</b>	5.0	6.7	8.6
News	-	<b>8.0</b>	1.1	5.7
Drama	4.2	4.4	<b>4.5</b>	4.4
Documentary	0.7	<b>4.3</b>	1.3	3.1
Soap	3.8	<b>3.9</b>	0.0	3.0
Sport	1.5	1.8	<b>6.1</b>	2.9
Children's	0.8	<b>3.8</b>	3.1	1.8
Current Affairs	<b>3.0</b>	1.2	0.7	1.6
Other	<b>3.0</b>	1.2	0.7	2.4
Mean <sup>1</sup>	4.8	4.0	2.5	

1. Total means are not equal to the sum of the individual means because the individual means had different counts. See Appendix D for the number of cases in each cell.

The live correction factors for most programme genres varied across the broadcasting stations. Comedies had the greatest variation, ranging from 14.4 percent for comedies broadcast on TVNZ2 to 1.4 percent for comedies screened on TVNZ1. However, the variations in the comedy correction factors across stations were not statistically significant. Further analysis found that the correction factors of TVNZ2 comedies were greatly skewed towards high live correction factors (skewness = 11.9879, se skew. = 0.1816). In fact, of the 179 comedies screened on TVNZ2, only 24 had correction factors over 12 percent (the highest was 1200%). These 24 comedies were all broadcast between midnight and 6am, and the majority were playbacks of "The Beverly Hillbillies". Due to these extreme outliers and because there were no significant differences across the stations, the average live correction factor for comedies was trimmed (by 5%). The resulting live correction factor of 2.5 percent provided a more accurate estimate of VCR ratings for comedies.

There were significant differences in the live correction factors across stations within the sport, children's, documentary, current affair, and soap opera genres; the significant differences are presented in Appendix E. For example, the live correction factors of soap operas that screened on TVNZ1 and TVNZ2 were significantly different from the live correction factors of the soap operas that were broadcast on TV3. In fact, it was quite

surprising that of the 48 soap operas viewed live on TV3 over the five week sample period, none were time shifted. The implications of these results are that the estimation of VCR ratings for sports programmes, children's programmes, documentaries, current affairs, and soap operas should take account of both genre and station effects.

Since news programmes are only broadcast on two stations, it was not possible to test the significance of the differences across the stations. The live correction factors for this genre varied by 7 percent, suggesting that there is a relationship between the station that the news is broadcast and live correction factors. Assuming that there is a relationship, the estimation of VCR ratings for this genre should also take account of both genre and station effects.

The movies and mini-series genre appeared to have a higher average live correction factor for programmes that screened on TVNZ2, however these differences were not significant. Further analysis found that TVNZ2 contained a number of movies with extremely high live correction factors which strongly influenced the average. Therefore, the trimmed mean (trimmed by 5%) of 6.7 percent seemed to be a more appropriate live correction factor for estimating the VCR ratings of movies and mini-series.

A summary of the appropriate genre/station live correction factors to use in the estimation of VCR ratings, is presented in Table 30. The live correction factors for stations that were not significantly different within the genres were averaged, with the exception of the news and movie genres which used trimmed average live correction factors.



**Table 30. Adjusted genre/station live correction factors**

Genre	TVNZ2	TVNZ1	TV3
	%	%	%
Comedy	2.5	2.5	2.5
Movies & Mini series	6.7	6.7	6.7
News	-	8.0	1.1
Drama	4.4	4.4	4.4
Documentary	1.0	4.3	1.0
Soap	3.9	3.9	0.0
Sport	1.6	1.6	6.1
Children's	0.8	3.4	3.4
Current Affairs	3.0	1.0	1.0
Other	2.4	2.4	2.4

To estimate time shift audiences, VCR ratings would be calculated by multiplying a programme's live ratings by the appropriate genre/station live correction factor. Assuming that the live correction factors presented in Table 30 are reliable, this method is likely to provide a better measure of total audiences than the method which is currently used to estimate VCR ratings overnight.

#### 7.2.4 Regression Analysis

The study also investigated the possibility of estimating VCR ratings using multiple regression. Specifically, the analysis examined whether live correction factors could be successfully modelled from six independent variables, namely, programme genres, stations, times and days of the week, and the dominant gender and age groups of the live audience. The analysis was based on quarter hour ratings, that is, VCR correction factors were calculated by dividing quarter hour VCR ratings by quarter hour live ratings<sup>9</sup>.

9. The analysis could have been based on quarter hour ratings or programme ratings. Quarter hour ratings are the primary measure from which programme ratings are calculated. Programme ratings smooth extreme values that may occur across the quarter hours of a programme. All other analyses in the study were based on programme ratings.

The regression equations which were calculated using standard regression and forward stepwise regression had extremely low  $R^2$  statistics. The highest  $R^2$  produced was 0.02 indicating that only two percent of the variation in the VCR correction factors was explained by the variables. This suggests that the variables are poor predictors of time shift audiences, and thus, this method would not be useful for estimating VCR ratings.

## CHAPTER 8. CONCLUSIONS

### 8.1 Conclusions

This research examined the effect of time shifting on television audiences, and investigated current and future methods of measuring time shift viewing.

Live ratings are delivered overnight to provide timely data to advertising agency staff and broadcasters; time shift data is not included in these ratings as the *overall* effect of time shifting on programme ratings is small and because the time shift viewing lag makes it impossible to include real time shift data in the overnight ratings. However, these reasons appear to be myopic as outlined below.

Although this study and others have found that the overall effect of time shifting on programme ratings is small, some programmes have time shift ratings of one or two percent, or VCR rating contributions as high as 92 percent, which accounts for a non-trivial proportion of total programme audiences. It seems that the main constraint impeding the inclusion of VCR ratings in the overnight ratings is the difficulty in measuring time shift audiences overnight.

At present, rating companies use either VCR recording or VCR playback to measure time shifting behaviour; both methods contain limitations. VCR ratings that are based on playback provide a direct measure time shift audiences, but they can not be included in the overnight ratings. In contrast, recordings can be used to provide an estimate of VCR ratings; however, these estimates not only seriously overestimate actual time shift audiences, but some programme genres are overestimated more than others.

Since it is not possible to include real time shift data in the overnight ratings and the current method of estimating VCR ratings produces inaccurate results, this study proposed three methods of estimating VCR ratings overnight. The first method involved adjusting the recording level of programmes by programme genre recording:playback ratios to provide estimates of the VCR ratings. A second method involved using same day playbacks of programmes as a base and adjusting them by programme genre viewing lag factors to give estimates of the VCR ratings. The third method involved estimating VCR ratings by multiplying the live rating of programmes by genre/station correction factors.

These methods assume that the genre correction factors or ratios found in this study are reliable, that is, that there are stable variations in recording:playback ratios, viewing lag factors, and live correction factors across programme genres. The methods offer the potential for improving the accuracy of overnight ratings, and, if implemented at present, are likely to provide more accurate overnight VCR ratings than those based on VCR recordings.

## **8.2 Implications**

The findings from this research have implications for rating companies, broadcasters, advertisers, and media planners.

Rating companies endeavour to provide valid and accurate programme ratings to broadcasters and media planners. This research provides implications for improving their measure of total programme audiences. At this stage, the rating companies could either implement one of the proposed estimation methods, as they are likely to provide more accurate estimates of programme audiences than the current overnight ratings portray, or, as a more cautious alternative, they could test the predictive accuracy of the methods.

Broadcasters depend on the validity and accuracy of programme ratings to price advertising slots and determine programme schedules. Considering that some programme audiences are much higher than the ratings suggest, broadcasters may not be gaining optimal audiences from their schedules. In addition, broadcasters may be under pricing some advertising time slots.

Although under priced advertising is a disadvantage for broadcasters, it creates an advantage for advertisers, as most advertisements (particularly those screened during movies) will have extra viewers which are not included in the price of the time slot. In addition, media planners who use ratings to select programmes that will satisfy certain reach and frequency objectives, may be exceeding their objectives. Obviously some time shifters will not see the advertisements in time shifted programmes due to zipping and zapping behaviours; however, as discussed in section 1.4, the wider issue of commercial avoidance remains a highly contentious topic as far as live viewing is concerned and the debate inevitably extends to time shifted commercials.

### **8.3 Limitations of the Research**

Several limitations need to be acknowledged in relation to the findings of this study. First, due to the non-experimental nature of this research, it is not possible to determine whether associations between variables are causal. That is, the purpose of this research was to determine whether relationships exist, and if so, how strong they were. For example, relationships were found between live ratings and VCR ratings, and also VCR ratings and programme genres, but it is unknown whether high live ratings cause high VCR ratings, or whether programme genres cause variations in VCR ratings.

Secondly, the accuracy of people meter data, that is, the data used in this study, relies on respondents to accurately record when they are viewing and when they are not. A number of studies have investigated the accuracy of “button-pushing” in people meter

households. Danaher and Beed (1993), who conducted a telephone survey of 365 panellists on AGB McNair's people meter, found a high (92%) level of compliance. Actual compliance levels are likely to be lower than 92 percent, considering that Danaher and Beed's (1993) survey would have contained some respondent bias. That is, the telephone interviewers identified themselves as being from AGB McNair, therefore, if respondents had not been using the people meter correctly when the interviewer rang, they may have lied about their actions to appear as though they were committed. Even though the accuracy of people meter data is not ideal, the people meter is currently the best method available for analysing television audiences.

Thirdly, when AGB McNair calculate ratings, the viewing of each people meter panel member is weighted to gain closer estimates of true population viewing. For example, if the panel under represents European men and over represents European women, European men will be given higher weights than European women. The people meter data used in this study was not weighted, as the weights were not supplied, therefore the viewing of some population groups may have been over or under represented.

## **8.4 Future Research**

The conclusions of this research advance two immediate issues that need to be addressed to improve the accuracy of overnight ratings. Firstly, replication research needs to be undertaken to test the reliability of the correction factors and ratios developed in this study, because the proposed VCR rating estimation methods will not be useful if the variations in the genre correction factors and ratios are not stable.

Secondly, extensions of this research are needed to compare the predictive ability of the proposed VCR rating estimation methods, to examine which method, if any, should be implemented by rating services.

An important consideration for future research is the weighting of the data. The results in this study were based on unweighted viewing. To improve the accuracy of the results, that is, to obtain programme ratings that are closer to true population audiences, future research should include the viewing weights of the panellists.

Future research could also investigate the influence of programme alternatives on a programme's VCR rating. Section 6.2 revealed that many of the top VCR rating programmes in the study were screened simultaneously on different channels. It is possible that the alternative programme options that are available on other stations at the time a programme is broadcast may influence the VCR ratings of the programme. At present, there appears to be limited research on this issue.

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## **APPENDICES**

## APPENDIX A. TECHNICAL APPENDIX

### A.1 Calculation of Ratings

Programme ratings are the average quarter hour rating for the quarter hours covered by the programme. Quarter hour ratings are calculated by multiplying the number of minutes an individual spends viewing a quarter hour by the individual's weight, then dividing each individual's weighted minutes by 15 minutes, to give each individual's weighted viewing contribution to the quarter hour. The weighted viewing contributions are then summed for the quarter hour and divided by the sum of the weights for all individuals, to give the quarter hour rating.

The ratings calculated for this study will not be identical to published ratings, as the necessary weighting information was not available. Instead all individuals were given the same weight, as the following example calculation shows.

*Viewing for quarter hour 72:*

Individual	Viewing Minutes	x	Weight	=	Weighted Minutes	/15 =	Weighted Viewing Contribution
1234	6		1		6		0.40
5678	15		1		15		1.00
9123	0		1		0		0.00
4567	0		1		0		0.00
8912	11		1		11		0.73
3654	0		1		0		0.00
7267	1		1		1		0.07
6547	0		1		0		0.00
8178	0		1		0		0.00
1899	0		<u>1</u>		0		<u>0.00</u>
			10				2.20

Quarter hour rating =  $2.20 / 10 = 22\%$

Two types of ratings were calculated in this study: live ratings which are based on live viewing, and VCR ratings which are based on time shifted viewing. The aggregation of live and VCR programme ratings gives the total programme rating.

A number of issues need to be considered in the calculation of VCR ratings. The first consideration is whether to base the calculation of VCR ratings on VCR recording or VCR playback. Considering that this study and previous research has found that levels of VCR recording are typically much higher than levels of playback (Levy, 1981; Kirkham, 1982; Levy, 1983; Fiddick, 1984; Hunt, 1987; Sims, 1989; AGB McNair, 1991; Warrens and Thompson, 1992; Mojo, 1994), VCR ratings in this study were quantified by measuring VCR playback rather than recording.

A potential problem associated with measuring VCR ratings via VCR playback is that individuals may play home recorded programmes on more than one occasion (Arbitron, 1979; Metzger, 1986; Hunt, 1987; AGB McNair, 1991). Since ratings are a measure of programme reach, multiple playbacks of programmes by individuals were discarded from the VCR rating calculations of this study.

Another issue to consider in the calculation of VCR ratings is the time frame within which tapes are assumed to have been played back. Recordings in this study were given at least one week to be played back, as this study and previous research estimates that a large majority of playbacks occur within this period (Fiddick, 1984; Hunt, 1987, AGB McNair, 1991).

## A.2 Calculation of VCR Rating Contributions

VCR rating contributions estimate the proportion of the total programme audience which is comprised of time shift viewers. In this study, VCR rating contributions for programmes were averaged and compared across a number of different variables, such as programme genres and stations. Average VCR rating contributions can be calculated by two methods, which produce slightly different results; the remainder of this section discusses these methods and the point at which they vary.

The following explanations are based on the calculation of average VCR rating contributions for programme genres<sup>1</sup>.

### Method 1

Average VCR rating contributions can be calculated by averaging the VCR rating contributions for each programme in the genre, for example:

$$\text{Average VCR rating contribution} = \text{Mean} \left( \frac{\text{Programme's VCR rating}}{\text{Programme's VCR rating} + \text{Programme's Live rating}} \right)$$

### Method 2

Average VCR rating contributions may also be calculated by dividing the average VCR rating for the genre by the average total rating for the genre, for example:

$$\text{Average VCR rating contribution} = \frac{\text{Genre's VCR rating}}{\text{Genre's VCR rating} + \text{Genre's Live rating}}$$

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1. In the study average VCR rating contributions were also calculated for stations, hours of the day, days of the week, and demographic groups.

The two methods result in slightly different average VCR rating contributions. In the second method the effects of extreme values are diminished in the averages of the live and VCR ratings, whereas in the first method extreme values have a stronger affect on the average VCR rating contributions. One method is not necessarily better than the other, they are just different ways of measuring the same thing, just as the mean and median statistics both measure central tendency.

The second method was used in the calculation of the VCR rating contributions<sup>2</sup> in chapter six. This method was selected because extreme values would not distort the rankings of the VCR rating contributions. The average VCR rating contributions calculated from this measure do not have a distribution, therefore, it was not possible to perform multiple comparison tests which examine the significance of the differences.

### **A.3 Calculation of Live Correction Factors**

Live correction factors are multipliers which can be used to calculate estimate VCR ratings from live ratings. In this study, live correction factors were averaged and compared across programme genres and stations. The calculation of live correction factors is very similar to the calculation of VCR rating contributions; the only difference is that live correction factors are only divided by live ratings rather than total ratings. As a result, average live correction factors can also be calculated by two methods, which produce slightly different results. These methods are discussed below; the explanations are based on the calculation of VCR rating contributions for programme genres<sup>3</sup>.

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2. To simplify the wording, average VCR rating contributions will be referred to as VCR rating contributions in the remainder of this chapter and in the text.

3. In the study live correction factors were also calculated for stations and age groups.



### Method 1

Average live correction factors can be calculated by averaging the live correction factors for each programme in the genre, for example:

$$\text{Average live correction factor} = \text{Mean} \left( \frac{\text{Programme's VCR rating}}{\text{Programme's Live rating}} \right)$$

### Method 2

Average live correction factors may also be calculated by dividing the average VCR rating for the genre by the average live rating for the genre, for example:

$$\text{Average live correction factor} = \frac{\text{Genre's VCR rating}}{\text{Genre's Live rating}}$$

Like the calculation of VCR rating contributions, the two methods result in slightly different average live correction factors, because in the first method extreme values have a stronger effect on the average live correction factors.

The first method was used to calculate the average live correction factors<sup>4</sup> in chapter seven for two reasons. Firstly, it was possible to detect if there were underlying patterns in the averages. For example, if within a programme genre there was a group of programmes with extreme values, the average correction factor for the genre would be larger than what would be expected by comparing the average live and VCR ratings; this is illustrated in more detail in chapter seven. The second reason was that it was possible to calculate multiple comparison tests to verify whether the differences in the correction factors were significant.

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4. To simplify the wording, average live correction factors will be referred to as live correction factors in the text.

## APPENDIX B. VCR USE

**Table B1.**     **Playing of time shifted material versus pre-recorded material by age groups**

Material	<i>Age group</i>							
	<i>5-19</i>		<i>20-34</i>		<i>35-50</i>		<i>50+</i>	
	Hours <sup>1</sup>	%	Hours <sup>1</sup>	%	Hours <sup>1</sup>	%	Hours <sup>1</sup>	%
Time shifted	94	29	102	36	113	40	233	63
Pre-recorded	233	71	181	64	170	60	136	37
Total	327	100	283	100	283	100	369	100

1. Average hours per week including multiple replays.

## APPENDIX C. VIEWING LAGS OF GENRES

**Table C1.** Proportion of programmes played back over first seven days by genre (for all programmes replayed over 28 days)

Genre	Replay delay (days)							
	0 %	1 %	2 %	3 %	4 %	5 %	6 %	7 %
All	40	29	9	4	3	3	2	2
Soap	64	23	5	3	2	1	1	0
Sport	60	21	3	3	1	3	1	0
News & C.A.	47	26	8	4	2	3	0	2
Children's	44	15	4	4	3	3	4	2
Comedy	41	28	9	2	1	2	2	3
Documentary	34	32	14	6	4	4	4	0
Drama	31	36	12	6	3	4	2	2
Movies & Minis	15	41	11	4	4	2	2	3
Other	52	20	6	3	2	2	1	2

## APPENDIX D. CASE NUMBERS

**Table D1.** Number of programmes in each programme genre<sup>5</sup>

Genre	Cases n
Movies & mini-series	117
Comedy	314
News	182
Drama	305
Soap	211
Documentary	241
Sport	70
Children's	641
Current Affairs	238
Other	494
Total	2813

**Table D2.** Number of programmes in each station

Station	Cases n
TVNZ1	753
TVNZ2	1120
TV3	940
Sky Sport	656
Sky Movies	431
Sky Orange	670
Sky News	625
Total	5195

5. Including only programmes screened on the free-to-air stations: TVNZ1, TVNZ2, and TV3.

**Table D3. Number of programmes in each day of the week<sup>5</sup>**

Day of the week	Cases n
Monday	419
Tuesday	433
Wednesday	447
Thursday	447
Friday	439
Saturday	326
Sunday	303
Total	2814

**Table D4. Number of programmes viewed predominantly by each gender group<sup>5</sup>**

Dominant gender group	Cases n
Mixed Audience	1440
Female majority	1077
Male majority	296
Total	2813

**Table D5. Number of programmes viewed predominantly by each age group<sup>5</sup>**

Dominant age group	Cases n
5-19	1051
20-34	648
35-49	184
50+	930
Total	2813

**Table D6. Number of programmes: genre by station**

Genre	TVNZ2	TVNZ1	TV3	Total
	n	n	n	n
Comedy	179	26	109	314
Movies & Mini series	60	14	43	117
News	121	-	61	182
Drama	78	171	56	305
Documentary	16	142	83	241
Soap	9	154	48	211
Sport	27	23	20	70
Children's	367	34	240	641
Current Affairs	80	63	95	238
Other	159	150	185	494
Total	1120	753	940	2813

## APPENDIX E. MULTIPLE COMPARISON TESTS

**Table E1. Correction factors of programme genres**

Genre	Correction Factor %
Movies & mini-series	8.6 <sup>b</sup>
Comedy	9.4 <sup>a</sup>
News	5.7
Drama	4.4
Soap	3.0
Documentary	3.1
Sport	2.9
Children's	1.8
Current Affairs	1.6
Other	2.4

**Multiple comparison test: LSD procedure**

Correction factors

- a. significantly different, at the 0.05 level, from dramas, documentaries, soap operas, sports, other, children's, current affair programmes.
- b. significantly different, at the 0.05 level, from documentaries, soap operas, other, children's, current affair programmes.

**Table E2. Correction factors of sports programmes across stations**

Station	Live Correction Factor %
TVNZ1	1.8
TVNZ2	1.5
TV3	6.1 <sup>a</sup>

**Multiple comparison test: LSD procedure**

- a. significantly different, at the 0.05 level, from TVNZ1 and TVNZ2.

**Table E3. Correction factors of children's programmes across stations**

Station	Live Correction Factor %
TVNZ1	3.8
TVNZ2	0.8 <sup>a</sup>
TV3	3.1

**Multiple comparison test: LSD procedure**

a. significantly different, at the 0.05 level, from TVNZ1 and TV3.

**Table E4. Correction factors of documentaries across stations**

Station	Live Correction Factor %
TVNZ1	4.3 <sup>a</sup>
TVNZ2	0.7
TV3	1.3

**Multiple comparison test: LSD procedure**

a. significantly different, at the 0.05 level, from TV3.

**Table E5. Correction factors of current affairs across stations**

Station	Live Correction Factor %
TVNZ1	1.2
TVNZ2	3.0 <sup>a</sup>
TV3	0.7

**Multiple comparison test: LSD procedure**

a. significantly different, at the 0.05 level, from TVNZ1 and TV3.



**Table E6.** Correction factors of soap operas across stations

Station	Live Correction
	Factor %
TVNZ1	3.9
TVNZ2	3.8
TV3	0.0 <sup>a</sup>

**Multiple comparison test: LSD procedure**

a. significantly different, at the 0.05 level, from TVNZ1 and TVNZ2.