What Advertisers Want: A Hedonic Analysis of Advertising Rates in South African Consumer Magazines

Nicolas Pietersma[1]

Working Paper Number 41

[1] School of Economics, University of Cape Town

What Advertisers Want: A Hedonic Analysis of Advertising Rates in South African Consumer Magazines

Nicolas Pietersma

September 12, 2006

Abstract

This article explores the role of circulation, readership and reader demographics in the determination of advertising rates in South African consumer magazines. The study uses panel data collected between 2000 and 2003 to quantify the relationships by assigning implicit prices to various magazine characteristics. Furthermore, a synopsis of the structure of the magazine industry in South Africa is developed using cluster-analytic techniques. The analysis lends some statistical credence to some widely held beliefs in the publishing industry; namely that advertisers value the young, the educated and the affluent as audiences. The role of race and gender in the determination of magazine advertising rates is also explored.

1 Introduction

Magazine publishers sell a peculiar product; one which generates two separate, but related, streams of revenue – advertising and sales. The magazine publisher, in effect, sells their one set of customers (readers) to their other set of customers (advertisers). As a result, the publisher's pricing decisions take on an additional level of complexity. In order to understand the driving forces behind strategic decisions made in the magazine publishing industry an important question needs to be addressed: What determines the value of a page of advertising?

Advertising space is not a homogeneous commodity. Its value is determined by not only the size of the publication's readership but also by the characteristics of its readership. The folk wisdom of the industry is that advertisers value publications with young, affluent and educated readers – a set of beliefs that has been repeatedly confirmed in academic and industry studies (Koschat and Putsis, 2002; Thompson, 1989). Studies focusing on the relationship between circulation and advertising rates generally suggest that the advertising rate increases as the circulation increases, but, at a decreasing rate (Hall, 1976; Krishnan and Soley, 1987, Kalita and Docoffe, 1999). The results presented in this paper come to similar conclusions for the South African magazine publishing industry over our sample period 2000 to 2003.

A page of advertising in a consumer magazine can be viewed as a bundle of goods for which no explicit market exists. One cannot directly buy the attention of 100 000 affluent, educated males between the age of 32 and 45. Instead, one buys a page of advertising in a business magazine. By observing the price of a page of advertising space (advertising rates), and the quantities of various characteristics associated with each observation, we can assign an implicit price, also known as a shadow price, to these pseudo-traded 'goods'. This form of analysis, known as *hedonic pricing* is an established pricing technique and is frequently used to evaluate markets characterized by high degrees of product differentiation – such as real estate, motor vehicles and consumer electronics (Rosen, 1974).[1]

While the main objective of this research is to attempt to determine the relationship between the price of advertising and the characteristics of readers, it is also interesting to pay some attention to issues of broader

[1] 'Hedonic' analysis may be used to refer to the broad set of methodologies that are used to evaluate product characteristics. In practice, the term is frequently used without direct reference to 'utility bearing attributes' (as the name might imply) (Rosen, 1974). The term 'conjoint' analysis avoids the misplaced reference to utility bearing attributes, but will not be used as it is somewhat arcane.

social relevance. For example, do black audiences trade at a discount? Does the behaviour of advertisers suggest that their decisions are motivated by anything other than the desire to maximize profits?

In August 2000 the South African Human Rights Commission published a document entitled "*Faultlines: Inquiry Into Racism In The Media*" - the product of a protracted and controversial investigation. The scope of the investigation was extensive and inevitably covered polemical territory that pitted the ideals of journalistic independence against the transformation objectives of the post-apartheid South African government. Among the issues given some consideration was the over-representation of white people in terms of media ownership and in senior editorial positions, as well as the asserted failure of the media establishment to give a voice to the interests and world view of black South Africans. It was also argued that the media's treatment of corruption and crime perpetuates racial stereotypes and is, to some extent, informed by sub-textual assumptions of black deficiency.

While most of these debates fall outside of the scope of this paper, one particular issue was raised that can be addressed by the research presented here – that of the inability of black media outlets to raise advertising revenues commensurate with the size of their audiences - a phenomenon attributed to the racist assumptions of advertisers and advertising agencies. In brief it was suggested in the report that *"...advertising agencies operate on the basis of historic links, jobs-for-pals, ignorance of the market or out of sheer prejudice."* (2000). Phil Molefe, former executive editor of the SABC, noted that the media industry mirrors the belief of advertisers that white audiences have the strongest spending power in the country.

While it can easily be demonstrated that publications with black readers do indeed battle to generate the kind of advertising revenues that similarly sized publications with white readers get, the findings presented in this paper suggests that the proportion of black readers, separate from income and educational differentials, is not a negative and statistically significant predictor of the discrepancies.

2 The Determination of Advertising Rates and Implicit Prices

Demand for advertising is derived from the profit maximizing goals of firms. The rational firm would advertise until such a time as the advertising adds as much to the present value of total revenue as it does to the present value of total costs (including costs incurred as a direct result of supplying additional quantities of advertised goods). Assuming that the marginal effectiveness of advertising is eventually decreasing, then there must be some optimal level of advertising for the individual business to purchase.

However, no firm knows with certainty whether the advertisement that it commissions will be successful, and even if it is, it is hard to gauge the value of things like 'brand awareness' in terms of long-run sales. What the advertiser does know is that some audiences are more valuable than others. Wealthy households have more disposable income and so are more likely to purchase an advertised product. Larger audiences are better than smaller ones because there are more potential buyers. Young adults set trends that are followed by teenagers and the middle-aged.

All these considerations will determine the advertiser's willingness to pay for advertising space in a given magazine. The price of advertising space is a function of the vector of characteristics that defines a magazine. Both buyers and sellers of advertising space take this information into account when making their decisions.

The decentralised decisions of many buyers and sellers are expected to convey information about the value of underlying characteristics through the price signaling system (Rosen 1974; Lancaster 1966). Arguably, a magazine that cannot find buyers for its advertising space is considered overpriced (given the 'bundle' of readers they have on offer) and will find themselves inclined to lower their price until such a time as they are competitive. The effects of the downward pressure on the price of their advertising space can be viewed not only as a correction in the rates of one magazine title but also as an incremental adjustment in the implicit price of the attributes that characterize that particular magazine.

If an underlying characteristic is fundamentally undervalued or overvalued at any given time, this would place a dispersed corrective pressure on the price of all actively traded goods that bear said characteristic. In our study this relates to advertising in the cross-section of consumer magazines, but no doubt such effects are felt in broader substitutes such as radio and television.

Implicit prices play the same coordinating role in the markets for characteristics as explicit prices play in a market for goods. Information is conveyed from advertisers to publishers about the desirability of different types of audiences through demand conditions. Information is conveyed from publishers to advertisers about

the costs and availability of advertising to some kind of an audience through the supply side. Thus far our discussion has focused on advertiser demand, but the question of supply also deserves some attention.

What factors determine whether or not a publisher is willing and able to change the amount of advertising that they supply? While it is certainly the case that 'cost conditions' matter (with regard to things like the price of paper, staff and printing) one could argue that the 'supply' of advertising has more to do with an editor's ability to get people to read his magazine. It needs to be made clear that the supply of advertising is not analogous to how many advertisements can be printed.

There are only two ways for a magazine to increase advertising output. The first is to sell more pages of ads and the second is to increase circulation (or readership). Selling more pages of ads is associated with an increase in the number of editorial pages, as most magazines target some advertising to editorial ratio (Ha and Litman, 1997). Costs are increased as printing expenditure increases and as the magazine is forced to source more editorial material; implying the usual relationship between costs and output. More importantly though, there is a logical limit to how lengthy a magazine can get. Once this limit is reached, the publisher can only sell more advertising by increasing circulation. But how does the publisher do this? He can offer trial subscriptions, lower the cover price, or attempt to improve the marketability of editorial content, or even advertise the magazine title elsewhere. None of these approaches offers a deterministic solution.

To complicate matters further, editors of upmarket magazines may find themselves in a bind should they attempt to dramatically increase circulation. The preferred editorial content of the mass-reader does not make for a very impressive readership profile from the point of view of advertisers (Thompson, 1989). Should the editor be successful in increasing readership, whether through pricing or content adjustments, she runs the risk of diluting her advertiser critical audience. This point can be illustrated anecdotally by the case of House and Garden between 1983 and 1985 (US edition). During this period circulation was scaled back from 1 000 000 to 500 000 copies, resulting in a significant increase in the average household income of the readership. The final result was that advertising revenues increased by some 75% (Krishnan and Soley, 1987).

In the short run the magazine publisher takes the size of his audience, and hence supply of advertising, as a largely given. In the long run we may argue that sustained "high" prices for advertising to a particular type of audience will result in a proliferation of new titles in genre's that serve this demographic, resulting in increased competitiveness within the genre and downward pressure on price.

3 Market Structure of the Magazine Publishing Industry in South Africa

One may ask whether the prior explanation of how prices are determined is anything more than an economists fable, a perfectly competitive 'just so' story?

To a certain extent, this skepticism is warranted and deserves to be addressed. The four largest South African magazine publishing houses (Media24, Johnnic Communications, Caxton and Ramsay Son and Parker) control well over 80% of the market for consumer magazines – suggesting a significant degree of market power. Whether or not this tells us anything depends on whether strategic pricing and content decisions are made at the group level or the magazine level. If rate setting decisions are made at the level of the magazine (*Heat*) rather than the publisher (Media24), one may be tempted to argue that there are a large number of pseudo-firms in the market and that the market is likely to be competitive. Although this line of thought reaches a desirable conclusion (that the market for advertising in magazines is competitive), it is not particularly convincing. Each major publishing house carries a diversified portfolio of titles and can place advertising to suit just about any demographic requirements. The result is that the same few publishing houses end up fighting for market share on multiple battlefronts. Regardless of what level we think pricing decisions are made at we come to the same conclusion; this is a highly concentrated industry.

However, by focusing on concentration (at any level) as the sole determinant of market power one can easily underestimate the competitiveness of the South African magazine publishing industry. One needs to take the following two factors into account.

Firstly, it is unlikely that any publisher can corner the advertising market over a particular demographic profile, especially if one considers 'near substitutes'. Besides magazines the advertiser can make use of newspapers, freesheets, radio, television, cinema, Internet, and outdoor advertising, not to mention sponsorship

of events, promotional goods and activities, product placement, 'guerrilla marketing', 'viral marketing' and a variety of other so-called 'below the line' advertising activities. Whatever the desired audience, there will always be multiple entry points.

When we turn our attention to the econometric relationship between audience characteristics and the price of advertising space this will be an important thing to bear in mind. The value of a characteristic in consumer magazines will be closely connected to the value of the corresponding characteristic in other mediums (radio, TV etc.). The 'market for attributes' is arguably not bound by any one medium, and as such its competitiveness is vastly underestimated if one focuses only on magazines.

The second point is that the magazine publishing industry has become increasingly contestable[2] in the era of cheap processing power and desktop publishing (Sumner, 2001). Arguably this has been the major factor fueling a multiplication of titles available in South Africa, as it has in the US and elsewhere. Small magazines have shown themselves to have viable business models, especially when they service a niche audience and/or syndicate with foreign magazine titles. Seeing as magazines are able to outsource printing, this leaves relatively few barriers to entry. If major publishers use their predominance to sustain high advertising rates, they will both trigger new entrants into their markets and encourage the growth of existing small publications. By this reasoning the ease of entry into magazine publishing is likely to generate greater competitiveness, even when industry concentration ratios are relatively high.

The purpose of this discussion is to argue the case that the market determines the price of advertising space and by extension of the implicit price of audience characteristics. We replace our concept of a 'price taker' with that of a 'price-schedule-taker' (Palmquist,1984). The firm wishing to advertise can influence the marginal price it pays for a page of advertising by varying the quantities of some characteristic purchased, but it cannot influence the overall price schedule.

That, at least, is the theory. In reality the price schedule is not smooth and continuous, but rather 'lumpy'. Advertisers with a certain audience in mind will have to find the 'closest fit' when they choose a publication to advertise in. Magazines differ by audience character and content and as such can never be perfect substitutes. But, the competitive distance between magazines is not beyond quantitative analysis. It is intuitively clear that Financial Mail and Finance Week compete directly with one another, and that Golf Digest competes indirectly by reaching a similar audience. But is there any way to measure competitive distance?

Using statistical information on age, income, education and gender, and assigning a percentile rank to each magazine in the sample, we are able to calculate a Euclidean distance measure between any two titles in four dimensional space (the technical details are included in Appendix 2). This distance measures can in turn be used to categorize magazine titles into clusters or give us a measure of difference between any two audiences. A family tree, or dendogram, of magazines (based on age, income, gender and education) is presented on the following page. Some titles have been excluded in order to make the diagram more tractable.

This procedure generates a convincing visual synopsis of the market using thematically blind algorithmic procedures.

At a linkage distance[3] of zero all magazine titles fall into their own cluster. As the linkage distance is increased to about 0.1 or 0.2 we find that 'obvious' substitutes are joined together to form the first few dyadic clusters (*Finance Week* and *Financial Mail*, *Bona* and *Drum*, *Compleat Golfer* and *Golf Digest*, *Cosmopolitan* and *Marie Claire*, *Rooi Rose* and *Sari*e etc.). At a slightly higher linkage distance we find super-clusters of magazine titles that serve more broadly similar audiences. A linkage distance of about 0.3 gives us clusters such as the one with *Fair Lady, SA Food and Home, Living and Loving, Joy, Rooi Rose* and *Sarie.* A linkage distance of 0.4 gives us *Bike Magazine, Car, Man Magnum* and *Topcar.*

As the linkage distance increases we find that the clusters begin to get larger in members and fewer in number, and that the similarities across the audiences become more tenuous. At the other extreme we see that at a linkage distance of about one all magazines fall into a single mega-cluster.

The tree diagram is useful for understanding how an advertiser with a specific type of audience in mind could go about evaluating potential substitutes. Assume an advertiser believes the audience offered by Conde Nast House and Garden best fits the profile of her target market. It is likely that she will also consider the

[2] The theory of contestability holds that the threat of competition by potential entrants can discipline firms to price their product such that they earn only normal returns, regardless of the state of concentration in the industry (Baumol, 1982).

[3] The predefined Euclidean distance between two clusters at which point the clusters are joined into one larger cluster.

price of advertising in Gardening SA as it is the closest substitute. Looking further afield, she may consider the advertising rate of magazines such as House and Leisure or Finesse, which fall into the same broad cluster as her first choice. This process also gives us an insight into the specific nature of the competitive pressures that a magazine may face. Assuming language is not an issue to advertisers, Farmer's Weekly competes closely with Landbouweekblad, but the nearest substitutes after that are 'long shots', so to speak. They have a kind of duopoly within a relatively sheltered corner of the market. It is only at a comparatively high linkage distance of about 0.5 that these agricultural magazines join the same cluster as Financial Mail, Getaway and Golf Digest.

There are a variety of ways of defining 'distance', as well as a number of different decision rules that can be used to decide when a new cluster should be formed (See Appendix 2 for discussion). The technique and choice of input variable used in the application of cluster analysis will also have a significant impact on the outcome.

4 Literature Review

The use of multiple regression hedonic pricing techniques in the study of advertising rates is surprisingly uncommon.

A paper entitled "Who Wants You When You're Old and Poor: Exploring The Economics of Media Pricing", by Martin Koschat and William Putsis (2000) forms the template for this study. Koschat and Putsis generate three main insights. Firstly, magazines with a young and affluent readership command an advertising rate premium over otherwise similar publications. Secondly, this premium is unjustified if one looks at the portion of national expenditure accounted for by this target audience. Thirdly the premium earned by magazines with young and affluent readers is likely to bias the content of the public media towards the interests and mindset of the young and well-off.

Koschat and Putsis used a straightforward cross-sectional model. They regressed the price of a full-colour page of advertising against a number of quantifiable magazine characteristics using ordinary least squares estimation techniques and a logarithmic transformation of all variables. The estimated coefficients of the explanatory variables can be used to calculate the shadow price of the characteristic, which gives us an insight into the desirability of the characteristic (from the demand side) and the cost of provision of the characteristic (from the supply side).[4] In the words of the authors "...these implicit or shadow prices can be thought of as a description of a competitive equilibrium in a plane on several dimensions on which buyers and sellers locate" (Koschat and Putsis, 2000).

Their demographic data was taken from the year 1990 and their rates data was taken from 1991. Their sample included 101 magazines and sample selection was largely determined by the availably of data from various media monitoring agencies – a "sampling methodology" also used in this study.

Koschat and Putsis found the following variables to be significant at the 95% level:

- Circulation
- Readers per copy
- Percentage of readers aged 29 – 39
- Percentage of readers with household income of over $56 000
- Percentage female readers
- Percentage female readers squared

Other than the percentage of female readers, all these variables had positive coefficients when regressed against price. As will be discussed later, the models presented in this paper come to similar conclusions about the role of circulation, readers per copy and income. As far as gender is concerned, this paper draws

[4] Intuitively, one might argue that it is more costly to produce a 'highbrow' general interest magazine than a 'lowbrow' general interest magazine because it becomes necessary to hire more educated (costly) journalists, and because low circulation 'highbrow' magazines do not enjoy the economies of scale of mass market publication.

different conclusions to Koschat and Putsis. The differences may be attributed to the the South African market or to differences in methodology that will be discussed later.

The results presented Koschat and Putsis (2000) are intuitive and unsurprising. What is interesting is the contention that the difference in the price of reaching high value segments, when compared to that of low value segments, does not seem to be justified by purchasing power differences. Koschat and Putsis point out, for example, that readers in the top income category are priced at about 6.2 times that of other categories, while the per capita consumption of the top income category is only about 2.7 times the lowest income category in their study. One also cannot point towards the scarcity of young/affluent readers, as these groups actually represent a disproportionately large portion of total magazine readers. The magnitude of the premium leads Koschat and Putsis (2000) to conclude that narrow economic explanations, focusing on either the purchasing power or the scarcity of young and affluent readers, are insufficient. It is argued that a combination of factors needs to be taken into account: including potential biases in the advertising industry,[5] a desire to tap into 'opinion' leaders and a higher responsiveness to advertising among the young.

There are a number of other papers and studies in media economics that identify high value audience segments (Reddaway, 1963; Goetler, 1999; Kalita and Ducoffe, 1995). One such study is *Circulation Versus Advertiser Appeal In the Newspaper Industry* by R.S Thompson (1989). This study focuses on the trade-off between the circulation of a publication and desirability of an audience to advertisers. Thompson argues that the market makes a distinction between 'quality' papers (such as the Financial Times) and 'popular' papers (such as the Sun). He refers to a previous study, by Mander (1978), that noted the fact that papers with both a low circulation as well as a low 'quality' reader profile are most likely to fail. More formally, Thompson used three-stage least squares to estimate a system of equations with circulation, cover price and the advertising rate as dependent variables. His study is notable for two reasons. Firstly, it confirms that there is a circulation versus advertiser appeal trade off, even when potential endogeneity problems are taken into account. Secondly, it was found that advertising rates vary positively with both circulation and the ABC reader quality measure. Part of the newspaper publisher's profit maximization problem is therefore to decide whether to move upmarket (and lose sales revenue) or to move downmarket (and lose advertising revenue).

Krishan and Soley (1987) also stressed the importance of targeting circulation, rather than simply building it. Their study examined the relationship between circulation, advertising rates and cost-per-thousand (CPM).[6] One important observation in their paper is that advertising rates tend to increase at a decreasing rate as circulation increases, or alternatively put, CPM's fall as circulation increases. If certain categories of costs increase linearly a journal could actually destroy it profitability by building circulation too aggressively.

The point can be clearly illustrated using the cross section of South African magazines used in this study. Krishnan *et al* (1987) present a similar graph based on their US dataset.

5 Sample and Variables

A panel of 55 cross sectional units over 4 time periods (2000-2003) was chosen as the best compromise between 'longer' and 'flatter' alternatives. As has been mentioned before the sample selection process was somewhat opportunistic – a magazine was included if commercial data on both demographics and circulation were available over the entire sample period. The good news is that all the agencies had data on all the largest and most established magazines – so while the sample is rather humble in terms of the number of titles, it does cover about 87% of the total readership reported by the South African Advertising Research Foundation in their AMPS survey.[7] The 55 titles in this study do not compare very favourably with the 100 odd titles in both Koschat and Putsis (2000) and Krishnan and Soley (1987), but the 4 time periods do help generate some consolatory degrees of freedom.

Nevertheless, the dimensions of this panel create some problems. Having only 4 time periods is quite limiting in terms of the choice of panel modeling techniques available. Seemingly unrelated regression models,

[5] Advertising copyrighters, journalists and editors are for the most part middle-class and degreed. It would not be surprising if the universe of their imagination reflects their own life experience.

[6] Advertising cost, per page of advertising, for every thousand magazines sold.

[7] This figure excludes TV Guides (such as TV Plus), magazines that come bundled with a newspaper (Sunday Times Inside) as well as store catalogue magazines (Edgars Club Magazine). The coverage by year is 93% for 2000, 87% for 2001, 86% for 2002 and 84% for 2003.

as well as so called time-series cross section models such as the Parks-Kmenta method are inappropriate when panel data has few observations across time – as is, arguably, the fixed effects model. Secondly, it becomes difficult to comment on explanatory variables that only vary over time – such as consumer confidence, the business cycle, the prevalence of Internet connections and the interest rate. All of these factors could reasonably be expected to influence the pricing behaviour of magazines, but to demonstrate this with only 4 annual time periods is problematic. There are also certain variables that are no doubt important, but for which no good data exists in South Africa.

From studies based on US and UK data, we know that factors such as 'advertising clutter' do play a significant role in determining the rates a firm can charge for advertising in one of its magazines (Ha and Litman, 1997). We also know that there is a pro-cyclical and lagged relationship between advertising expenditure and the business cycle, one which presumably has some influence on the price of advertising space in magazines (Ashley, Granger and Schmalensee, 1980; Ostheimer, 1980).

Further, we know that advertising space in magazines usually trades at a discount to the publicized rate. The magnitude of these discounts will vary according to the fortunes of the magazine and the bargaining power of the advertiser (usually large companies get better rates). If media research companies could track the discounts, no doubt they would. The reality is that these arrangements are sensitive, and as such, are concluded behind closed doors.

When it comes to identifying 'incorrectly' priced advertising space, these missing variables serve to increase our zone of ignorance and reduce the explanatory power of the multiple regression models used to decompose the price of advertising into implicit prices for characteristics. However, the variables that were available proved to have significant explanatory power in their own right and largely confirmed both the results of previous studies and intuitive expectations regarding the signs of their coefficients.

The variables in Table 1 were regressed, in various permutations, against the price of a full colour full page advertisement.

Data on the dependent variable was provided courtesy of Media Manager.[8] All monetary variables are adjusted for inflation to constant 2000 rands. Readers per copy is the SAARF AMPS readership figure [9] divided by the ABC circulation figure. Affordability refers to the number of magazines that could be purchased with one month's income, for the median income household of a particular magazine. The Afrikaans dummy variable is a categorical variable based on the language the magazine is written in. The so called 'gender homogeneity' is the squared percentage of male readers plus the squared percentage of female readers. The annual figures used in this study are based on an average of the biannual figures reported for any given year by the ABC and AMPS. Linear interpolation was occasionally used to fill in missing data.

The median of income of readers,[10] rather than the average, was identified as the best measure of central tendency.

SAARF only report on readers aged between 16 and upwards in their AMPS data. As such, the 'percentage if readers under the age of 29' variable is likely to underestimate the percentage of young readers a magazine enjoys, and this bias is likely to be more pronounced the younger the readership of the magazine.

Other explanatory variables were considered (such as the sales-growth and cover price of the magazine) but preliminary regressions suggested that they were not particularly enlightening. The LSM measure taken from AMPS data has a statistically significant relationship with the dependent variable in its own right. However, combined with the income and education measures in a multiple regression framework, it proved to have no further explanatory value.

The affordability variable is examined because it may tell us more about the perceived quality of a magazine than price, which does not take the relative income of the audience into account. The affordability of a magazine, through crude self-selection, also gives us more insight into the kind of disposable income an audience might have. After all, two households with very similar monthly incomes may have vastly different propensities to consume non-essential goods – be it through existing wealth differences or perhaps different attitudes towards saving.

The 'gender homogeneity' variable is essentially a Herfindahl concentration measure used to gauge the extent to which a magazine targets one gender, without actually reflecting what that gender is. So for

[8] Special thanks should go to Mr. Mike Leahy of the "Media Inflation Watch" project at Media Manager.

[9] The readership is the total number of readers of a publication as estimated by survey methods – including readers who have not bought their own copy of the magazine. Circulation is based on audited sales figures.

[10] Please note, when interpreting graphs and regression results, that income and circulation are both measured in thousands.

example, the gender homogeneity of Bike SA or Your Baby is expected to be higher than that of Gardening SA or You. The hypothesis is that a magazine that targets one gender closely may be able to charge a premium over more generic publications.[11]

The only variable that requires further commentary is the "weekly publication" dummy variable. There is no clear a priori expectation about the sign of a weekly magazine but it was frequently found to be significant in preliminary regressions and so has been included. Perhaps it is because most weekly magazines are considered 'established' and have a reliably large readership. Dropping frequency from weekly to fortnightly, or from fortnightly to monthly, is often the first thing a magazine does when it is in financial distress.

A graphical analysis provides some justification for the inclusion of the square and the cube of circulation (see below). The solid fitted line below is consistent with a positive first difference of rates with respect to circulation, a negative second difference, and a positive third difference.[12] In fact, this has been true of the estimated functions of all permutations of the hedonic price model presented in this paper. Advertising rates increase at a decreasing rate within the range of most of the sample. Beyond a certain size, however, instead of rates increasing at a decreasing rate, they increase at an increasing rate. It is hard to explain this outcome – but as will be seen it is quite robust even when other variables are taken into account in the multiple regression framework. Possible explanations are that this is the product of a few outliers or some degree of market power afforded to super large magazines such as "*Huisgenoodt*" and "*You*". The dotted line is fitted with Huisgenoodt excluded from the sample.

6 Regression Methodology

Dimensions of N=55 and T=4 are less than ideal for most panel techniques. As such a series of informative yet imperfect regression results will be presented with a brief discussion of the statistical problems. The regression results presented in this paper include the pooled ordinary least squares and group means estimators,[13] cross sectional ordinary least squares for each year in the sample, followed by a presentation of some one- and two-way random effects estimators.

In order to legitimately pool all 220 observations and use straightforward ordinary least squares the model's residuals need to satisfy certain conditions for normality. Firstly there must be no spatial correlation between the residuals of cross sectional units. This implies that there is no relationship between the residuals of any two cross sectional observations over time. In other words, if demand for *Car* and *Drive* move together for common reasons, that are not captured by the independent variables, then the consistency of the model is called into question. A negative spatial correlation is just as problematic, if surges in demand for advertising in *Car* magazine's is routinely made at the expense of Drive, and visa versa, we expect a negative correlation to exist in their residuals. Again, this would be problematic. Secondly, there should be no autocorrelation. Within group autocorrelation is particularly problematic in this kind of panel in that if the predicted value falls short of, or exceeds, the actual value in the first period then then it is quite likely that similar predictive errors will occur in other periods. This problem can be partly addressed within the OLS framework by using standard autocorrelation remedies, such as the Prais-Winsten transformation, on a group by group basis (see results section). Thirdly there should be no groupwise heteroskedasticity. This implies that the variance of the residuals does not differ systematically from one cross sectional observation to another.

If these conditions hold the residuals are said to be spherical and we can use pooled ordinary least squares (Beck and Katz, 1995). Our intuitive expectation, unfortunately, is that the residual element generated by a dataset of this nature would be non-spherical. Furthermore, by using pooled OLS we are assuming two important things. Firstly, that there is no unobserved heterogeneity. This means that there should be no systematic differences between cross sectional units that influence the dependent variables, other than those accounted for by independent variables. Secondly, using OLS assumes some degree of structural homogeneity - that relationships across all cross sectional units, and all time periods, can be described by the same equation. If some relationship changes over time, or if some relationship holds for some magazines

[11] See *Audience Characteristics and Bundling: A Hedonic Analysis of Magazine Advertising Rates,* by Koschat and Putsis (2002) for a fuller explication of this idea.

[12] Regression fitted using OLS. The formula for the fitted line is given as: $Y = 7553.13 + 210.40X - 1.0925X^2 + 0.002X^3$. Coefficients significant at the 95% level.

[13] Also known as between-effects estimator.

but not others, then we cannot present a single equation that expresses the 'true' nature of these relationships across time and space.

It is clear that all of these conditions do not hold for the sample at hand. The group effects explain some 72% of the variation in the residuals from the pooled classical regression model – an indication that we cannot afford to ignore them.

Furthermore, the Baltagi-Li Lagrange multiplier statistic, which is traditionally used to test whether an effects model is more appropriate than the pooled classical linear regression model, returns a score of 129.52.[14] This score is associated with a negligible possibility (less than 0.001%) of an incorrect rejection of the null hypothesis and suggests that an 'effects' model should be used.

As such regression results produced by the OLS model should be treated with some caution, but they are presented nonetheless, even if only as a means of exploring the data. The most common techniques used to address these problems are of course the fixed and the random effects models (Baltagi, 1995). The fixed effects model uses dummy variables to tag the cross sectional observations[15] – thus accounting for any group specific effects that are not captured by the independent variables (in other words, the dummy variables capture unobserved heterogeneity). This method calculates coefficients mathematically equivalent to the "within group" estimator. The within group estimator extracts the group means from the dependent and independent variables, respectively, and then calculates beta coefficients based on the remaining variation (which is longitudinal or "within group"). In other words:

$$\left(Y_{it} - \bar{Y}_i\right) = \alpha + \beta_j \left(X_{jit} - \bar{X}_{jt}\right) + e_{it} \tag{1}$$

This solves the problem of unmodelled group heterogeneity and helps normalize the residuals, thus giving us consistent estimates (Baltagi, 1995). For the purposes of this research, however, the fixed effects approach is not appropriate. Preliminary fixed effects regressions were littered with insignificant t-statistics and unintuitive signs.

The fixed effects approach is not appropriate for large N small T type panels, especially when there is very little within group variation over the sample period. The reason for this is that the fixed effects model effectively "wipes out" between group variation, and the estimated coefficients are then based only on within group variation.[16] For many variables in this sample, there would be little variation left at all! The gender breakdown of Bike SA does not change more than one or two percent during the sample period – and the same can be said of the racial breakdown of Bona as well as the percentage of House and Leisure readers under the age of 29. This problem, of low within group variation, is exacerbated by the fact that there are only 4 years in the sample period, and hence there is not much time for the dependent and independent variables to change. Furthermore, using the fixed effect model would not allow us to explore categorical variables such as for "Afrikaans" by including dummies.

The random effects model is a suitable compromise. Instead of transforming the data so as to extract the group means (which deals with the problem of unmodelled heterogeneity but also destroys useful information contained in the between group variation), we transform the data so as to remove only a portion of the group means. This is known as the Fuller-Battese transformation (Baltagi, 1995). The random effects model is a weighted average of the between and the within effects, with weighting determined by the amount of variance accounted for in the residuals as a result of group effects. As such:

$$\left(Y_{it} - \theta\bar{Y}_i\right) = \alpha + \beta_j \left(X_{jit} - \theta\bar{X}_{jt}\right) + e_{it} \tag{2}$$

Because the random effects model does not extract all between group variation it is more efficient than the fixed effects model, can deal with dummy variables, and also works well with comparatively shorter panels. It is also possible to compute "two-way" random effects models which account for time period effects in a similar manner to group effects. The results of two-way random effects models will be presented but the technical details of the two-way method do not warrant further explanation in this paper other than to say that two-way models control for time heterogeneity as well as group.

[14] The Baltagi-Li LM statistics is 130.62 for the two-way regressions, which include both group and period effects. Again, this suggests a less than 0.001% chance of an incorrect rejection of the null. For the parsimonious specification, which will be discussed later, the corresponding figures are 216.61 for the one-way model and 199.92 for the two-way model. This suggests that regardless of how one 'cuts' the data, an effects model is appropriate.

[15] This method is also known as the least squares dummy variable method (LSDV).

[16] All between group variation is captured in the dummy variables.

By comparison to pooled OLS, the random effects model should go some way towards normalizing the residuals and providing a more consistent estimator. The random effects model, unfortunately, is not without its own problems. Because group effects have not been included as explicit independent variables, as they are in the fixed effects model, the group effects form a component of the residuals, such that:

$$e_{it} = \nu_{it} + u_i \tag{3}$$

As has been mentioned before, the random effects model is a weighted average of the within and between effects estimate. The weighting is determined by θ, which is the estimated [17] variation in the residual element accounted for by group effects (u_i). If group effects do not account for residual variance at all then θ is equal to zero and the random effects model is equivalent to pooled ordinary least squares. If group effects account for all the variation in the residuals, then θ is set to one, and the random effects model is the same as the fixed effects (within) model.

The fact that group effects are a component of the residual element can be problematic. If there is a relationship between the independent variables and the (unmodelled) effects it would imply a relationship between the independent variables and the residual element, in violation of the Gauss-Markov assumptions of the classical linear regression model. If this is indeed the case the model may be also biased and inconsistent (Baltagi, 1995). Because the fixed effects approach models group effects as an explicit explanatory variable it is not prone to this problem. The generally accepted statistical test used to determine whether it is more appropriate to use the random effects model or fixed effects model is the Hausman test. This tests the null hypothesis that the estimated co-efficients from the random effects model (which is efficient but potentially biased and inconsistent) are not significantly different from the fixed effects model, which we know to be consistent (albeit inefficient). The reasoning is that if the estimated coefficients are not statistically different, then it is certainly appropriate to use the more efficient of the two models – which is the random effects model.

This paper presents the results from 4 random effects regressions – full one-way and two- way random effects regressions as well as parsimonious[18] regressions that include only significant variables. For the 'full' models it is impossible to compute the Hausman statistic for algebraic reasons. For the so-called parsimonious models the Hausman statistics are 41.19 (one-way) and 61.74 (two-way). These test statistics imply that one can reject the null hypothesis with over 99.9% certainty, and are therefore suggestive of the fixed effects model.

However, rejection of the null hypothesis in the Hausman test does not automatically rule out the use of the random effects model (Beck, 2001), it simply means that we cannot categorically exclude the possibility of biased and inconsistent results. All the Hausman test does is test whether estimated coefficients between the fixed and random effects models are different. It does not test for inconsistency itself. To "pass" the Hausman test is a sufficient but not necessary justification for using the random effects model over the fixed effects model. If estimated coefficients differ between the random and the fixed effects model this can very plausibly be attributed to the fact that the random effects model makes use of between group variation while the fixed effects model does not. Intuitively speaking, it should not come as a surprise that using different information in a statistical model may yield different results. Thus the random effects estimators are, despite some statistical misgivings, presented alongside the group means, cross-sectional and pooled OLS regressions. From this spread of results we derive our conclusions.

The results of the various regressions are now presented along with a discussion of what conclusions we can draw from the data. Tables include estimated coefficients, probabilities and t-statistics.

7 Discussion of Results

In terms of the variables analyzed it is clear that some relationships remain stable and significant regardless of how one cuts the data, while others are significant in some regression analyses but not others. The strength of the conclusions we draw should be informed by the extent to which a variable is significant across

[17] A number of approaches can be used to estimate the group effects component of residuals. The models presented in this paper use Nerlove's approach, which bases the estimated group effects

[18] A stepwise process was used to select variables in the parsimonious regression – the most 'insignificant' variables were excluded, and the model re-estimated, until such a time as only variables significant at the 95% level remained.

models. All predictors were significant at the 95% level in the pooled OLS regression and at least one of the cross-sectional regressions – indeed this was the criterion upon which they were judged for inclusion in the study.

The strongest predictor of advertising rates was doubtless circulation. Circulation, circulation squared and circulation cubed were statistically significant predictors of advertising rates at the 95% level for all 11 regression results presented in this paper. Furthermore, there was no sign reversal across the various specifications. The magnitudes of the coefficients estimated are also very stable in comparison to some of the other independent variables. Insofar as the first and second difference of circulation with respect to the advertising rate is concerned, our intuitive expectation, and the results of previous studies, are largely confirmed for our South African dataset. Advertising rates increase at a decreasing rate as circulation increases – at least for most of the sample. As for the positive third difference, there is no obvious a priori reason to have expected such a strong result and we may be inclined to dismiss it as an idiosyncrasy of the South African market. It will be interesting to see if this cubic relationship reflects the magazine industries of other countries.

Although one cannot make direct comparisons, it is worth noting that the magnitude of the coefficient to circulation estimated in the above regressions is broadly comparable to that estimated by Koschat and Putsis (2000). While their estimate suggests that a 10% increase in circulation would result in about a 7.7% increase in advertising rates, the regressions presented above suggest a figure of between 3.4% and 5.4% (percentages calculated from the mean see table below).

Household income is clearly an important predictor of advertising rates. Unsurprisingly there is a high degree of multicollinearity between income on the one hand and education, race, readers per copy and affordability on the other.

Nevertheless, income is positive and significant at the 95% level for all regressions except for the two full random effects models where the fact that income is not significant at the 95% in the full random effects model can be explained by the fact that it was modeled quadratically. It is instructive to note that when the squared term is dropped in the 'parsimonious' model income is significant even at the 99% level.

Income squared is negative and significant at the 95% level in most cases with the exception of the cross-sectional regression in 2002, the autocorrelation corrected OLS regression and the 'full' random effects models. This suggests that advertising rates increase as income increases, but at a decreasing rate. There are no sign reversals for income across the specifications. Income is also one of the variables that is retained in the parsimonious specification.

Readers per copy is significant at the 90% level for 6 of the 11 specifications: the pooled OLS, the autocorrelation corrected pooled OLS and the group means regressions as well as the one-way random effects. It is also included in the parsimonious one-way random effects models where it is significant at the 95% level. The estimated coefficient to readers per copy is positive, in line with our expectations. There are no examples of sign reversal for readers per copy. There is sufficient statistical evidence to suggest that the more hands a magazine passes through the better this is for advertising.

In order to facilitate interpretation of the regression results it is sometimes useful to examine what the implied relationship between dependent and independent variables is in terms of percentages. The implied change in advertising rates for a ten percent change the independent variable is presented on the following page for the pooled OLS, the group means regression and the four random effects models. In the case of a dummy independent variable a straightforward percentage effect is calculated.

It is interesting to note that while a 10% increase in circulation can be expected to result in an increase in advertising rates of between 3.41% and 5.03%, a 10% increase in the readers per copy can only be expected to increase advertising rates by between 0.55% and 1.63%. This implies that the value of the secondary reader is much lower than that of the person who purchases the magazine.

A possible explanation is that the advertising industry puts more faith in circulation figures than in readership figures, but the more likely explanation is that a person who is willing to pay for a magazine is also more likely to be willing to pay for products advertised in the magazine. Similarly, a person who actually buys a magazine is likely to fit the profile of the target market for a magazine more closely than someone who happens to flip through a magazine afterwards. Many readers may be of the 'waiting room' variety – people who would never think of seeking out a given magazine title, are as uninterested in the content as they are in the products typically advertised in the magazine, but who nonetheless read them to stave off boredom or to pass time. Readers with some sense of dedication to the subject matter of a magazine are

likely to make a better audience for the purposes of advertising.

Education is a positive determinant of advertising rates. It was found that the percentage of degreed readers was a significant predictor of advertising rates for 8 out of 9[19] regressions at the 90% level and 6 out of 9 regressions at the 95% level. The fact that education is a significant predictor of advertising rates at the 90% level in the one- and two-way random effects model, and that there are no instances of sign reversal, suggests that one is quite safe in arguing that advertisers are willing to pay more for an educated audience.

The estimated impact on advertising rates of an increase in the percentage of degreed readers is six times greater in the group means regression than in the random effects regression. While the estimated impact of a ten percent increase in circulation ranged only from 3.41% to 5.03%, the comparable figures for education would range from 5% to 32%. This kind of variability, and multicollinearity with other indicators of affluence, makes it hard to quantify the exact impact of education other than to say its effect is positive.

Greater magazine affordability was found to negatively impact on the advertising rate. It is worth noting that price itself was not a particularly promising predictor of advertising rates in preliminary regressions. As far as statistical results are concerned affordability was found to be a significant and negative predictor of advertising rates in every regression with the exception of the 2001 cross-sectional analysis. The magnitudes were also relatively stable. The random effects regressions suggested that a 10% increase in affordability will be associated with about a 1.25% to 1.45% decrease in advertising rates, and the figure was about 3.55% for the group means regression. The evidence to suggest that greater affordability has a negative impact on the advertising rate is compelling in its consistency across various models.

Household income is not a perfect measure of the purchasing power of readers. It does not measure the purchasing power of individuals within a household, nor does it tell us how many dependents a household supports. Affordability and education are the kind of variables that may fill in some of these gaps. Affordability gives us some insight into accumulated wealth, as well as serving as a direct measure of the reader's propensity to consume non-essential goods. Less affordable magazines are likely to be considered luxury goods and are likely to have some inherent appeal as an advertising medium.

While affordability was found to be an unexpectedly reliable predictor of advertising rates, the percentage of readers under 29 years of age was unexpectedly "lukewarm". Only in the pooled OLS regression, and in the cross-sectional regression of 2001, was the variable found to be significant at the 90% level – as as we have discussed, confidence may be overestimated in the pooled OLS regression. The percentage of readers under 29 variable was not prone to sign reversals in different specifications of the model. While there is enough evidence to suggest that a young readership is probably a good thing, in this case we need to reserve judgment about the strength and consistency of this effect. Based on the studies discussed in the literature review, it is surprising that the result was not stronger.

There is evidence that weeklies receive a premium over the rest of the sample. In the group means regression, and most of the cross-sectional regressions, the weekly frequency dummy variable was found to be insignificant. However, in the random effects models and the pooled OLS the weekly dummy was found to be significant and the estimated strength of the effect stable. Cross sectional analysis was prone to sign reversal from the predominantly positive norm over the different years, but these cases were never statistically significant.

Caution should be exercised in interpreting this evidence. As has been discussed before, weekly publication is some indicator of the health of a publication. When magazines falter, it is common to see them decrease frequency from weekly to fortnightly, or from fortnightly to monthly. It is equally common to see a magazine showing healthy growth step up the frequency. By way of subject matter, the business magazines with affluent readers are more likely to be weekly publications because they disseminate news of a more timeous nature.

8 Race and Language

Contrary to the assertions of the panel consulted in the Human Rights Commission's *Inquiry into Racism in the Media*, it does not seem to be the case that advertisers are somehow racially biased against black audiences. In fact, the regression analysis suggests that if anything the proportion of black readers is a positively related to advertising rates. There are no instances of sign reversal and it is only in the one-way

[19] This excludes the parsimonious specification.

random effects model that race is an altogether insignificant independent variable. As far as the parsimonious specification of the random effects models is concerned, the proportion of black readers was included as a positive predictor of advertising rates only in the two-way specification. The estimated coefficient in the random effects models were smaller than the pooled, group means and cross sectional estimates.

While the statistical results suggesting that black readers are not discounted, the results raise an equally interesting question – how come, once all other information is taken into account, black readers seem to fetch a premium? The a-priori expectation was that race would be an entirely insignificant predictor of advertising rates.

The prima facie evidence of a racial bias in the market, that 'black' magazines with high circulations fail to secure high advertising rates, is explained fully by the inclusion of socioeconomic indicators such as income and education.

The political lesson to be learned from this is that one should be careful about blaming advertisers and the media industry for racism when the seeming bias in the market is explained by the economic fundamentals. If you want to fix the apparent bias in the media industry you need to address the pervasive inequalities of opportunity and income that beset the entire South African economy and social landscape. The Human Rights Commission's inquiry fell short in that it did not lay the blame for the apparent racism at the foot of economic inequalities created by half a century of apartheid policy, and it was perhaps too quick to finger advertisers as the contemporary architects of the bias. Or alternatively put, the inquiry placed too great an explanatory burden on agency to the neglect of more deterministic factors.

As far as language is concerned, the evidence to suggest that it is a reliable determinant of advertising rates is unconvincing. While the Afrikaans dummy was positively related to rates and significant in the pooled OLS regression, it was insignificant elsewhere and showed sign reversal across differently specified models.

9 The Role of Gender

The percentage of female readers seems to be positively associated with advertising rates. The strength of this result is, however, not large, and it is significant at the 90% level only for the cross sectional regression of 2003 and for the pooled OLS regression. However, there are no sign reversals and the magnitude of estimated coefficients remain relatively stable across the differently specified models. It is interesting to note that the result with regards to gender differ from those reported in Koschat and Putsis' 2000 paper, which reported a negative relationship between the percentage of female readers and advertising rates. This discrepancy is probably owing to the fact that an explicit gender homogeneity measure was used as an explanatory variable and the fact that the models presented in this paper do not use the square of the percentage of female readers as an explanatory variable. Alternatively the result may be explained by differences between the American and the South African markets.

It seems that magazines that target a gender aggressively, such as Your Family does for women or Car does for men, earn a premium over magazines with a more balanced gender profile. The gender homogeneity variable is significant under the "full" random effects regressions as well as the pooled OLS regressions and two of the four cross sectional regressions. There is only one instance of sign reversal in the cross sectional regression for 2001 – where this variable is associated with a highly insignificant t-statistic. Advertisers are willing to pay more for an audience that better fits their intended target market – this principal finds a particularly clear application when it comes to gender.

This outcome provides some support for the hypothesis explored in the paper *Audience Characteristics and Bundling: A Hedonic Analysis of Magazine Advertising Rates* by Koschat and Putsis (2002). In this paper they argued that if publishers were able to break their readership base down to its demographic components and publish special editions targeted at these components they would be able to earn a significant 'unbundling' premium. According to Koschat and Putsis, if publishers could separate readers out by gender, in particular, they could generate an average advertising rate premium of about 21.1%.

Their method [20] was to use the results from their hedonic analysis to calculate the advertising rate of a two hypothetical magazines with gender homogeneous audiences. The total circulation of each hypothetical magazine was equal to the number of male or female readers for the original (non-hypothetical) subject

[20] Obviously, this estimate is based on their sample of 101 US magazines.

magazine. The premium that these magazines earn is then broken down into that which is explained by targeting a single gender and that which is explained by circulation effects.[21] The results presented earlier in this paper argue for same conclusion as the one reached in Koschat *et al* (2002), that advertisers are willing to pay a premium for a more gender homogeneous audience. However, the conclusion is reached using a different approach to Koschat and Putsis by modeling gender homogeneity as an explicit independent variable via the Herfindahl type measure.

While Koschat *et al* estimated that, on average, the premium generated unbundling from would be about 21.1%, the estimate based on the results presented in this paper is 22.2% from the pooled OLS regression, 15.4% from the one-way random effects model and 16.9% from the two-way random effects model.[22]

10 Conclusion: Key Findings and Advancements

This paper has examined the determinants of advertising rates in the South African magazine publishing industry using established hedonic pricing methods. In doing so, it generates insights into the implicit prices of magazine characteristics and in so doing into "what advertisers want". Studies applying hedonic pricing methods to magazine advertising rates are surprisingly rare internationally, and are non-existent for the South African market.

While the discussion of the determination of implicit prices is not original, the use of Euclidean distance measures and cluster analytic techniques to describe the South African magazine market is novel. Although one can be sure that advertisers and publishers do not need quantitative assistance to identify competitor magazine titles, Euclidean distance measures could in theory provide some insight into the substitutability of magazines for the purposes of advertising.

It was found that a cubic and highly significant relationship exists between advertising rates and circulation. For most magazines in the sample, advertising rates increase at a decreasing rate as circulation increases – this is in line with a priori expectations and with comparable studies. Unsurprisingly, it was found that more affluent readers, as measured by median household income, command an advertising premium. It was also found that advertising rates are higher for less affordable magazines, all other things held equal. The evidence that these factors influence advertising rates is very convincing.

It was also argued that young and educated audiences are seen as desirable by advertisers and that advertising in weekly magazines seems to command a premium. It would be difficult to argue convincingly that being an Afrikaans-language magazine makes any difference at all. The proportion of female readers may positively influence the advertising rate, but the evidence for this was shaky. This paper provides statistical evidence that demonstrates that magazines which target a single gender mare closely earn a premium for this.

Another interesting interpretation of the results is that while having more readers per copy is certainly associated with higher advertising rates, the magnitudes suggest that the advertisers pay more for the 'first' reader. The implicit price difference may be up to six-fold by one estimate.

In this study it was found that the proportion of black readers, separate from other socioeconomic indicators, does not result in an advertising rate discount. It is hoped that this result will inform a more market friendly discourse when the issue of racism in the media re-enters the public debate, which no doubt, it will.

References

[1] Ad Focus. (2004). Ed. Jeremy Maggs. BDFM Publishers (Pty)

[2] All Media Products Survey. (2000 – 2003). South African Advertising research Foundation. www.saarf.co.za

[21] Because advertising rates increase at a decreasing rate as circulation increases we need to account for the premium that one would generate simply from taking a magazine and splitting its circulation into two, without changing any other characteristics.

[22] Based on the estimated impact of a 4085 unit increase in the gender homogeneity variable. This figure is based on the difference between the average magazine gender homogeneity score (5914) and the score of a perfectly homogeneous magazine (10 000). Percentage calculated from the mean.

[3] Ashley, R., Granger, C.W.J. and Schmalensee, R. (1980). "Advertising and Aggregate Consumption: An Analysis of Causality." *Econometrica*. Volume 48, p. 1149-1168. The Econometric Society.

[4] Audit Bureau of Circulations Report. (2000-2003). Audit Bureau of circulations.

[5] Baltagi, B.H. (1995). Econometric Analysis of Panel Data. John Wiley and Sons, Inc.

[6] Baumol, W.J. (1982). "Contestable Markets: An Uprising in the Theory of Industry Structure." *American Economic Review*. Volume 72. American Economic Association.

[7] Beck, N. (2001). Longitudinal (Panel and Time Series Cross Section) Data. (Notes published on the Internet). http://weber.uscd.edu/~nbeck

[8] Beck, N. and Katz, J.N. (1995). "What To Do and Not To Do With Time Series Cross Section Data." *The American Political Science Review.* Volume 89, p. 634-647. The American Political Science Association.

[9] Chay, K.Y and Greenstone, M. (1998). "Does Air Quality Matter? Evidence from the Housing Market," *NBER Working Papers 6826*, National Bureau of Economic Research, Inc.

[10] Faultlines: Inquiry Into Racism in the Media. (2000). Published by the South African Human Rights Commission.

[11] Greene, W.H. (2003). NLOGIT. Econometric Software Ltd. www.nlogit.com

[12] Ha, L. and Litman, B.R. (1996). "Advertising Clutter in Consumer Magazines: Dimensions and Effects." *Journal of Advertising Research*. July/August 1996, p. 76-84. Cambridge Journals.

[13] Ha, L. and Litman, B.R. (1997) "Does Advertising Clutter Have Diminishing and Negative Returns?" *Journal of Advertising.* Volume 26, p. 31-43. M.E. Sharp Inc.

[14] Hall, R.I. (1976). "A System Pathology of an Organization: The Rise and Fall of the Old Saturday Evening Post." *Administrative Science Quarterly.* Volume 21, Number 2, p. 185-211. Cornell University.

[15] Hausman, J.A. (1978). "Specification Tests in Economics." *Econometrica*. Volume 46, p. 1251-1271. The Econometric Society.

[16] Kalita, J.K. and Ducoffe, R.H. (1995). "A Simultaneous-Equation Analysis of Pricing, Circulation and Advertising Revenue for Leading Consumer Magazines." *Journal of Media Economics*. Volume 8(4), p. 1-16. Lawrence Erlbaum Publishing.

[17] Koschat, M. and Putsis, W.P. (2000). "Who Wants You when You're Old and Poor: Exploring the Economics of Media Pricing." *Journal of Media Economics*. Volume 13(4), p. 215-232. Lawrence Erlbaum Associates.

[18] Koschat, M. and Putsis, W.P. (2002). "Audience Characteristics and Bundling: A Hedonic Analysis of Advertising Rates." *Journal of Marketing Research*. Volume 39, p. 262-273. American Marketing Association.

[19] Krishnan, R. and Soley, L. (1987). "Controlling Magazine Circulation." *Journal of Advertising Research*. August/September 1987, p. 17-22. Cambridge Journals.

[20] Lancaster, K.J. (1966). "A New Approach to Consumer Theory." *Journal of Political Economy*. Volume 74, p. 132-156. University of Chicago Press.

[21] Mander, M. (1978). "The Integration of Advertising and Circulation Sales Policies." In Henry, H. (ed.). Behind The Headlines: The Business of the British Press: Readings in the Economics of the Press. P. 72 – 80. Associated British Press.

[22] Media Manager Directory. (2000-2003). Media Manager Pty. Ltd. www.mediamanager.co.za

[23] Ostheimer, R.H. (1980). "Magazine Advertising During Recessions." *Journal of Advertising Research*. Volume 20, p. 11-16. Cambridge Journals.

[24] Palmquist, R.B. (1984). "Estimating the Demand for Characteristics of Housing." *Review of Economics and Statistics.* Volume 66, p. 394-404. MIT Press.

[25] Rosen, S. (1974). "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition." *Journal of Political Economy.* Volume 82, Number 1, p. 34-55. University of Chicago Press.

[26] Statistica (Data analysis software system). (2004). Statsoft Inc. Version 7. www.statsoft.com

[27] Sumner, D. (2001). "Who Pays For Magazines? Advertisers or Consumers?" *Journal of Advertising Research.* Volume 41, p. 61-67. Cambridge Journals.

[28] Thompson, R.S. (1989). "Circulation Versus Advertiser Appeal in the Newspaper Industry: An Empirical Investigation." *Journal of Industrial Economics.* Volume 37, Number 3. p. 259-271. Blackwell Publishing.

[29] Triplett, J.E. (1967). "Automobiles and Hedonic Quality Measurement." *Journal of Political Economy.* Volume 77, p. 408-417. University of Chicago Press.

Figure 1

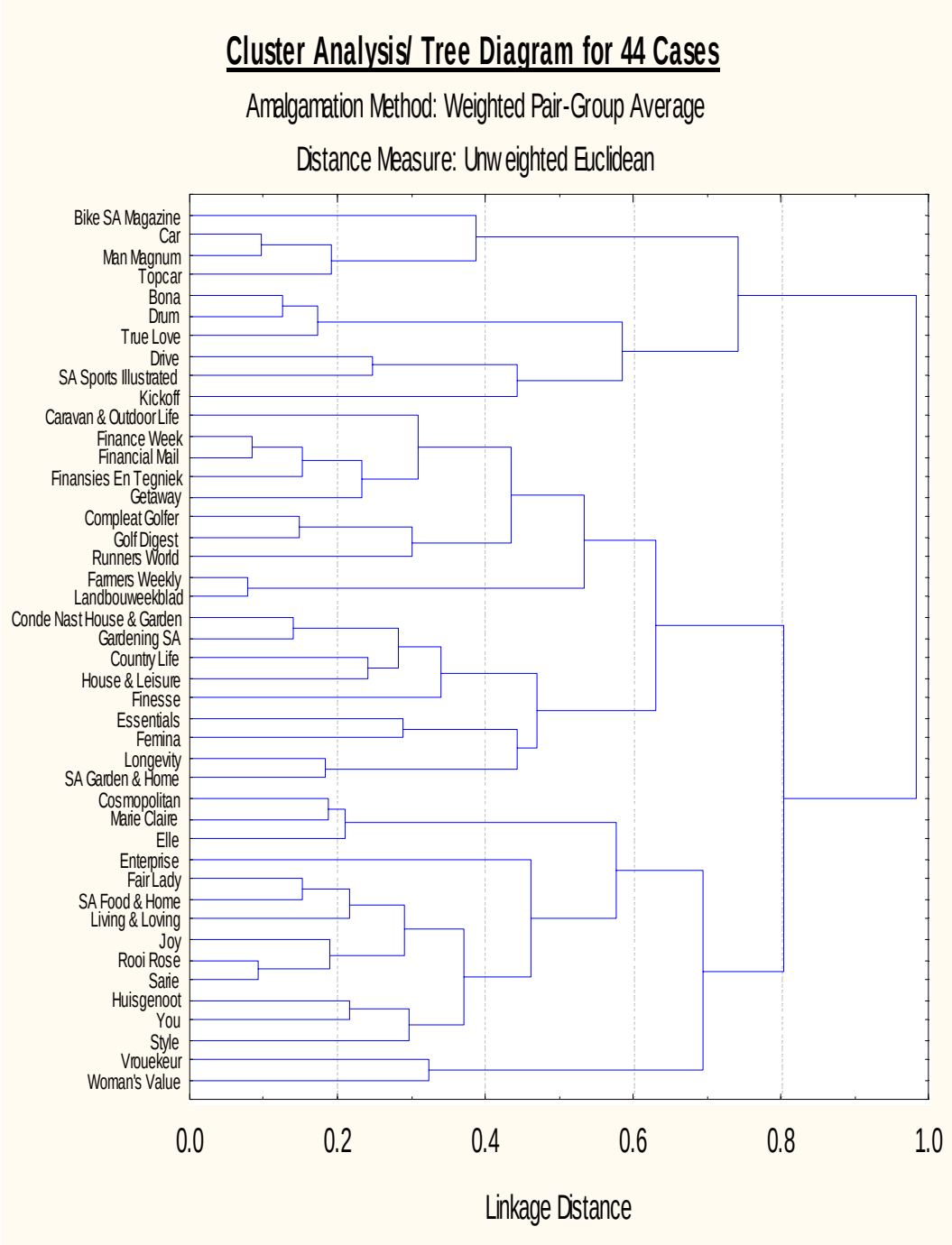
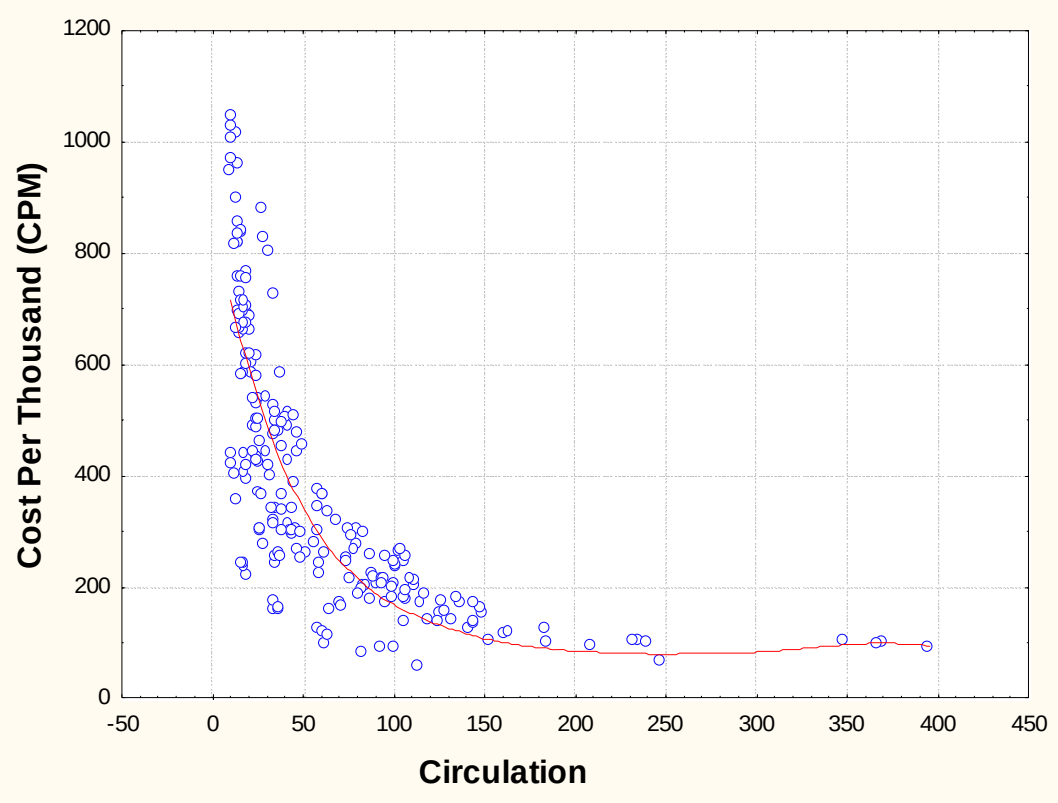

Cluster Analysis/ Tree Diagram for 44 Cases
Amalgamation Method: Weighted Pair-Group Average
Distance Measure: Unweighted Euclidean
Bike SA Magazine
Car
Man Magnum
Topcar
Bona
Drum
True Love
Drive
SA Sports Illustrated
Kickoff
Caravan & Outdoor Life
Finance Week
Financial Mail
Finansies En Tegniek
Getaway
Compleat Golfer
Golf Digest
Runners World
Farmers Weekly
Landbouweekblad
Conde Nast House & Garden
Gardening SA
Country Life
House & Leisure
Finesse
Essentials
Femina
Longevity
SA Garden & Home
Cosmopolitan
Marie Claire
Elle
Enterprise
Fair Lady
SA Food & Home
Living & Loving
Joy
Rooi Rose
Sarie
Huisgenoot
You
Style
Vrouekeur
Woman's Value
0.0
0.2
0.4
0.6
0.8
1.0
Linkage Distance

Figure 2
SCATTERGRAM OF COST PER THOUSAND AND CIRCULATION (SA)[23]



[23] Data sourced from ABC report and Media Manager. Circulation measured in thousands

Figure 3

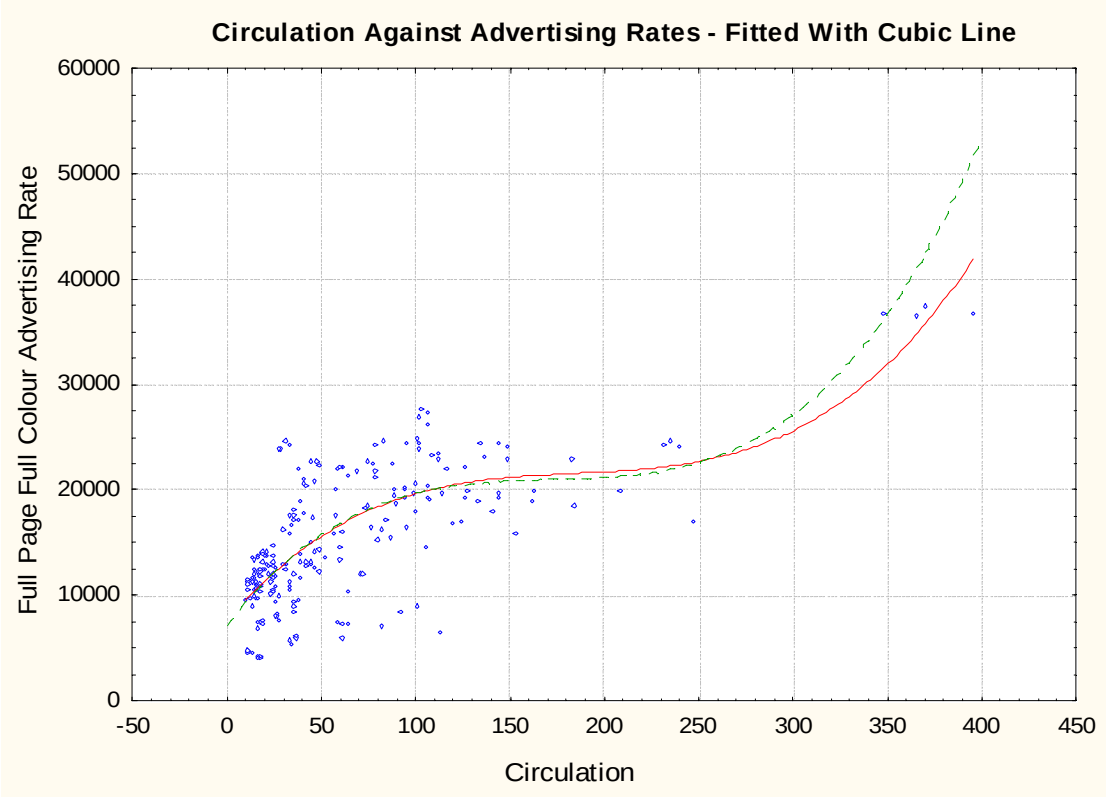

Circulation Against Advertising Rates - Fitted With Cubic Line
Full Page Full Colour Advertising Rate
60000
50000
40000
30000
20000
10000
0
-50
0
50
100
150
200
250
300
350
400
450
Circulation

Table 1
VARIABLES USED IN THE EMPIRICAL ANALYSIS

Variable	Source
Circulation	ABC
Circulation^2	ABC
Circulation^3	ABC
Readers per copy	ABC and AMPS
Median household income	AMPS
Median household income squared	AMPS
Percentage of readers with university education	AMPS
Affordability	ABC and AMPS
Afrikaans dummy variable	Generated
Percentage of black readers	AMPS
Percentage of readers under the age of 29	AMPS
Percentage of female readers	AMPS
Gender homogeneity	AMPS
Weekly publication dummy variable	AMPS
Constant	Not Applicable

Table 2
REGRESSION RESULTS POOLED ORDINARY LEAST SQUARES
AND GROUP MEANS

Variable	*Pooled OLS N=220*		*Pooled OLS (Prais-Winsten)*[24] *N=165*		*Group Means Regression N=55*	
Circulation	259.57		251.69		290.03	
	.0000	11.94	.0000	7.35	.0000	6.44
$Circulation^2$	-1.24		-1.25		-1.44	
	.0000	-7.421	.0000	-4.49	.0001	-4.04
$Circulation^3$	0.0022		0.0024		0.0026	
	.0000	6.92	.0000	4.14	.0002	3.77
Readers Per Copy	184.18		131.95		277.58	
	.0072	2.72	.0575	1.91	.0809	1.74
Median Income	5926.02		2951.75		7416.96	
	.0000	5.68	.0105	2.58	.0027	2.99
$Median\ Income^2$	-301.10		-105.38		-409.97	
	.0000	-4.85	.1554	-1.46	.0029	-2.97
Readers with University Education (%)	378.04		129.80		507.07	
	.0000	4.97	.0747	1.79	.0137	2.46
Affordability of Magazine	-9.58		-9.02		-10.09	
	.0000	-4.71	.0001	-4.10	.0267	-2.21
Afrikaans Dummy Variable	2018.44		-1713.66		2599.81	
	.0318	2.16	.1928	-1.30	.1915	1.30
Black Readers (%)	171.56		82.53		193.09	
	.0000	5.90	.0112	2.56	.0073	2.68
Readers Under 29 (%)	62.60		30.20		66.35	
	.0018	3.16	.3136	1.01	.1032	1.63
Weekly Dummy Variable	2433.12		4224.70		2452.03	
	.0112	2.56	.0006	3.47	.2347	1.19
Female Readers (%)	27.18		21.86		25.27	
	.0339	2.13	.2374	1.18	.3327	0.96
Gender Homogeneity	0.85		0.56		0.90	
	.0096	2.62	.1848	1.33	.1598	1.40
Constant	-34347.05		-14722.92		-42916.83	
	.0000	-6.41	.0000	-5.36	.0007	-3.38
R^2	.7981		.6509		.8585	
Adjusted R^2	.7843		.6183		.8090	

[24] Rho=0.5463

Table 3
REGRESSION RESULTS: 2000 TO 2003 CROSS-SECTIONS

Variable	*2000*		*2001*		*2002*		*2003*	
Circulation	254.80		295.90		260.03		312.63	
	.0000	6.20	.0000	5.94	.0000	5.04	.0000	6.41
Circulation^2	-1.26		-1.47		-1.28		-1.67	
	.0001	-4.28	.0005	-3.82	.0038	-3.07	.0003	-3.99
Circulation^3	0.0022		0.0027		0.0023		0.0031	
	.0002	4.18	.0008	3.63	.0064	2.88	.0007	3.67
Readers Per Copy	159.55		405.72		126.37		157.84	
	.3850	0.87	.0265	2.30	.4796	0.71	.1603	1.43
Median Income	4191.22		8464.86		5358.94		7267.05	
	.0333	2.20	.0015	3.41	.0436	2.08	.0037	3.08
Median Income^2	-273.26		-444.86		-281.41		-337.94	
	.0152	-2.53	.0023	-3.25	.1011	-1.68	.0192	-2.44
Readers with University Education (%)	731.46		415.64		391.72		229.87	
	.0000	4.81	.0618	1.92	.0431	2.09	.1808	1.36
Affordability of Magazine	-6.73		-2.36		-14.39		-15.32	
	.0741	-1.83	.6090	-0.52	.0262	-2.31	.0001	-4.49
Afrikaans Dummy Variable	1713.48		3313.70		200.36		2475.99	
	.3497	0.95	.0135	1.52	.9210	0.10	.1923	1.32
Black Readers (%)	125.93		252.82		127.56		205.68	
	.0172	2.48	.0036	3.10	.0466	2.05	.0056	2.93
Readers Under 29 (%)	51.85		100.47		54.52		66.64	
	.1339	1.53	.0342	2.19	.2502	1.17	.1736	1.38
Weekly Dummy Variable	-720.84		-13.32		3258.40		6720.85	
	.6806	-0.42	.9951	-0.00	.1929	1.32	.0009	3.59
Female Readers (%)	-18.02		41.19		23.46		50.69	
	.4852	-0.70	.1915	1.33	.3658	0.92	.0481	2.04
Gender Homogeneity	1.32		-0.02		0.70		1.50	
	.0432	2.09	.9758	-0.03	.3234	1.00	.0198	2.42
Constant	-26802.36		-50909.01		-25800.69		-45042.04	
	.0092	-2.74	.0007	-3.65	.0528	-1.99	.0003	-3.99
R^2	.8578		.8324		.8138		.8540	
Adjusted R^2	.8080		.7737		.7486		.8029	

Table 4

REGRESSION RESULTS: RANDOM EFFECTS MODELS[25]

Variable	*One Way Random Effects*		*Two Way Random Effects*		*Parsimonious One Way Random Effects*		*Parsimonious Two Way Random Effects*	
Circulation	157.79		167.25		146.29		150.95	
	.0000	6.42	.0000	7.60	.0000	5.55	.0000	6.32
2 Circulation	-0.60		-0.67		-0.55		-0.59	
	.0001	-3.98	.0000	-4.77	.0006	-3.44	.0001	-3.96
3 Circulation	0.0009		0.0010		0.0007		0.0009	
	.0004	3.53	.0000	4.40	.0038	2.89	.0004	3.52
Readers Per Copy	93.88		42.61		103.97			
	.0319	2.14	.3793	0.88	.0123	2.50		
Median Income	877.14		1055.74		479.92		604.56	
	.2342	1.19	.1392	1.48	.0065	2.72	.0008	3.37
Median Income²	-21.86		-24.75					
	.6350	-0.47	.5807	-0.55				
Readers with University Education (%)	86.11		103.75					
	.0652	1.84	.0300	2.17				
Affordability of Magazine	-4.06		-4.12		-3.51		-3.63	
	.0037	-2.90	.0031	-2.95	.0112	-2.53	.0092	-2.60
Afrikaans Dummy Variable	-1639.95		-1449.34					
	.2246	-1.21	.2094	-1.25				
Black Readers (%)	22.37		42.93				39.18	
	.3352	0.96	.0519	1.94			.0232	2.27
Readers Under 29 (%)	16.01		25.49					
	.4946	0.67	.2362	1.19				
Weekly Dummy Variable	2373.33		2182.82		2006.70		2048.42	
	.0094	2.59	.0097	2.58	.0352	2.10	.0229	2.27
Female Readers (%)	17.67		20.76					
	.3112	1.01	.1791	1.34				
Gender Homogeneity	0.58		0.64					
	.0969	1.66	.0491	1.96				
Constant	-1271.57		-3840.05		6770.94		2165.39	
	.7616	-0.30	.3418	-0.95	.0000	4.20	.4071	0.83

[25] θ is equal to 0.86, 0.80, 0.91 and 0.88 respectively. The corresponding figure for the time dimension of the random effects model is 0.67 and 0.57 respectively.

Table 5

IMPLIED PERCENTAGE EFFECT ON ADVERTISING RATES POSITIVE DUMMY OR TEN PERCENT CHANGE[26]

	Pooled	*Group Means*	*One-Way Random Effects*	*Two-Way Random Effects*
Circulation	5.03%	5.43%	3.53%	3.82%
Readers Per Copy	1.08%	1.63%	0.55%	0.25%
Income	14.96%	7.58%	2.43%	3.02%
University (%)	24.38%	32.00%	5.55%	7.69%
Affordability	-3.42%	-3.55%	-1.45%	-1.46%
Afrikaans Dummy	13.01%	16.76%	-10.57%	-9.34%
Black Readers (%)	11.07%	12.45%	1.44%	2.77%
Less Than 29 (%)	4.04%	4.28%	1.03%	1.65%
Weekly Dummy	15.70%	15.81%	15.30%	14.07%
Female Readers (%)	1.75%	1.63%	1.14%	1.34%
Gender Homogeneity (%)	3.23%	3.45%	2.23%	2.45%

Table 6

IMPLIED PERCENTAGE EFFECT FROM "PARSIMONIOUS" ESTIMATOR[27]
POSITIVE DUMMY OR TEN PERCENT CHANGE

	One-Way Random Effects	*Two-Way Random Effects*
Circulation	3.41%	3.48%
Readers Per Copy	0.61%	N/A
Income	2.02%	2.54%
Affordability	1.25%	1.29%
Black Readers (%)	N/A	2.53%
Weekly Dummy	12.94%	13.21%

[26] Coefficients that are insignificant at the 90% level are highlighted in gray. The percentage change of a variable is calculated from the mean.

[27] This excludes the parsimonious specification.

Appendix 1

List of Magazines Included in the Sample
With Average Statistics for Sample period

Title	Circulation ('000)	Median Household Income (R'000)	Percentage of Female Readers	Percentage of Black Readers
Animal Talk	14.5	6.0	52	28
Bike SA Magazine	35.8	8.0	19	7
Bona	139.7	1.3	57	98
Car	108.3	7.4	20	26
Caravan & Outdoor Life	17.6	9.2	34	14
Compleat Golfer	22.2	8.8	21	28
Conde Nast House & Garden	42.7	7.4	60	24
Cosmopolitan	104.4	6.7	66	30
Country Life	33.8	8.5	57	17
Drive	15.9	6.1	16	33
Drum	109.4	2.1	56	95
Elle	44.7	6.6	74	33
Enterprise	21.6	4.6	41	77
Essentials	85.6	7.9	81	13
Fair Lady	94.2	5.6	76	34
Farmers Weekly	11.6	6.3	34	26
Femina	68.0	6.5	80	28
Finance Week	16.0	8.9	33	36
Financial Mail	30.1	9.3	30	42
Finansies En Tegniek	17.2	10.1	34	9
Finesse	66.5	7.5	76	6
Gardening SA	41.8	7.3	57	22
Getaway	98.1	9.7	44	10
Golf Digest	16.3	8.5	22	23
House & Leisure	36.5	8.3	63	26
Huisgenoot	369.7	5.1	56	7
Joy	17.2	5.8	61	27
Kickoff	58.7	1.6	17	94
Landbouweekblad	43.0	6.6	36	9
Living & Loving	46.4	4.7	78	42
Longevity	29.0	9.1	70	18
Man Magnum	26.7	7.4	20	23
Marie Claire	62.7	6.9	78	25

Title	Circulation ('000)	Median Household Income (R'000)	Percentage of Female Readers	Percentage of Black Readers
Mens Health	78.1	7.3	31	31
PC Format	17.7	8.8	19	15
People	97.0	5.5	58	33
Readers Digest	159.2	4.6	51	41
Rooi Rose	140.1	5.6	72	9
Runners World	16.2	7.7	31	27
SA Food & Home	23.6	5.3	69	44
SA Garden & Home	92.8	8.5	61	17
SA Sports Illustrated	41.2	4.9	23	41
Sarie	146.8	5.6	72	10
SL	20.7	7.3	36	21
Style	23.4	4.9	62	42
Stywe Lyne	35.2	8.0	25	3
Topcar	34.6	7.6	15	26
True Love	123.4	2.2	62	95
Vrouekeur	61.0	5.4	72	3
Wine	10.9	8.5	37	26
Woman's Value	125.8	6.4	83	17
Y Mag	12.1	3.3	37	81
You	238.2	5.0	60	35
Your Baby	24.9	4.7	80	47
Your Family	80.1	6.0	78	24

Appendix 2

Technical Details of Cluster Analysis and Alternative Tree Diagrams

The first step in constructing a tree diagram or assigning magazines to clusters is the construction of a measure of distance between individual titles, and later, between clusters. The purpose of a distance measure is to distill information on a number of variables down to a single measure of difference. This measure is obviously sensitive to the constructive methods used and so it is important to be clear about exactly what steps are taken. The formula used to calculate the distance between magazines is essentially an N-dimensional extension of Pythagoras' theorem, such that:

$$D(x, y) = \sqrt{\left(\sum_{i=1}^{n} (x_i - y_i)^2\right)}$$

Where i refers to the variable, n refers to the number of variables used, and x and y refer to the score, on the relevant variable, of the magazine titles. This measure is known as Euclidean distance. There are other measures of distance[1] but the Euclidean approach is most common (Statistica Electronic Manuel, 2004).

The variables (dimensions) used to calculate the distance between titles in the graph presented in the main body are age, income, education and the gender breakdown of readers. More specifically, the percentage of readers under the age of 29, the median income of households of readers, the percentage of university graduates among readers and the percentage of female readers. These variables are given equal weight, though this is a matter of specification, not necessity. Finally, the Euclidean measure of distance is sensitive to scale, which is an undesirable property in that titles might cluster together differently depending on whether the unit of measurement for household income is rands or thousands of rands. To circumvent this difficulty all variables were converted to percentile ranks. This adjustment was largely successful, however it must be noted that it makes the distance measure sensitive to sample inclusion.

The result of this effort is a table, 55 by 55, of the distances between any two magazines. The distance measure has no interpretable meaning, but can readily be used for comparative purposes. A table of selected magazines and their Euclidean distances has been included for illustrative purposes. As can be seen on the table below *Finance Week* is closer to *Financial Mail* than it is to *Cosmopolitan* (0.08 vs. 0.88), but it is closer to *Cosmopolitan* than it is to *Bona* (1.41). It is these bilateral Euclidean distances measures that are then used to place the magazines in clusters.

Once one starts putting magazines into clusters, it becomes necessary to address how to define the distance between clusters and when to amalgamate clusters. The method used in this paper is to take the distance between two clusters to be the average distance of all

1 Including so-called city-block distance (which is merely an average distance across variables), Chebychev distance, power distance and percentage disagreement.

individual pairs between two clusters, weighted to take the difference in cluster size into account. As one progressively increases the linkage distance[2] more clusters join together until eventually there is only one 'megacluster'.

Table of Selected Euclidean Distances

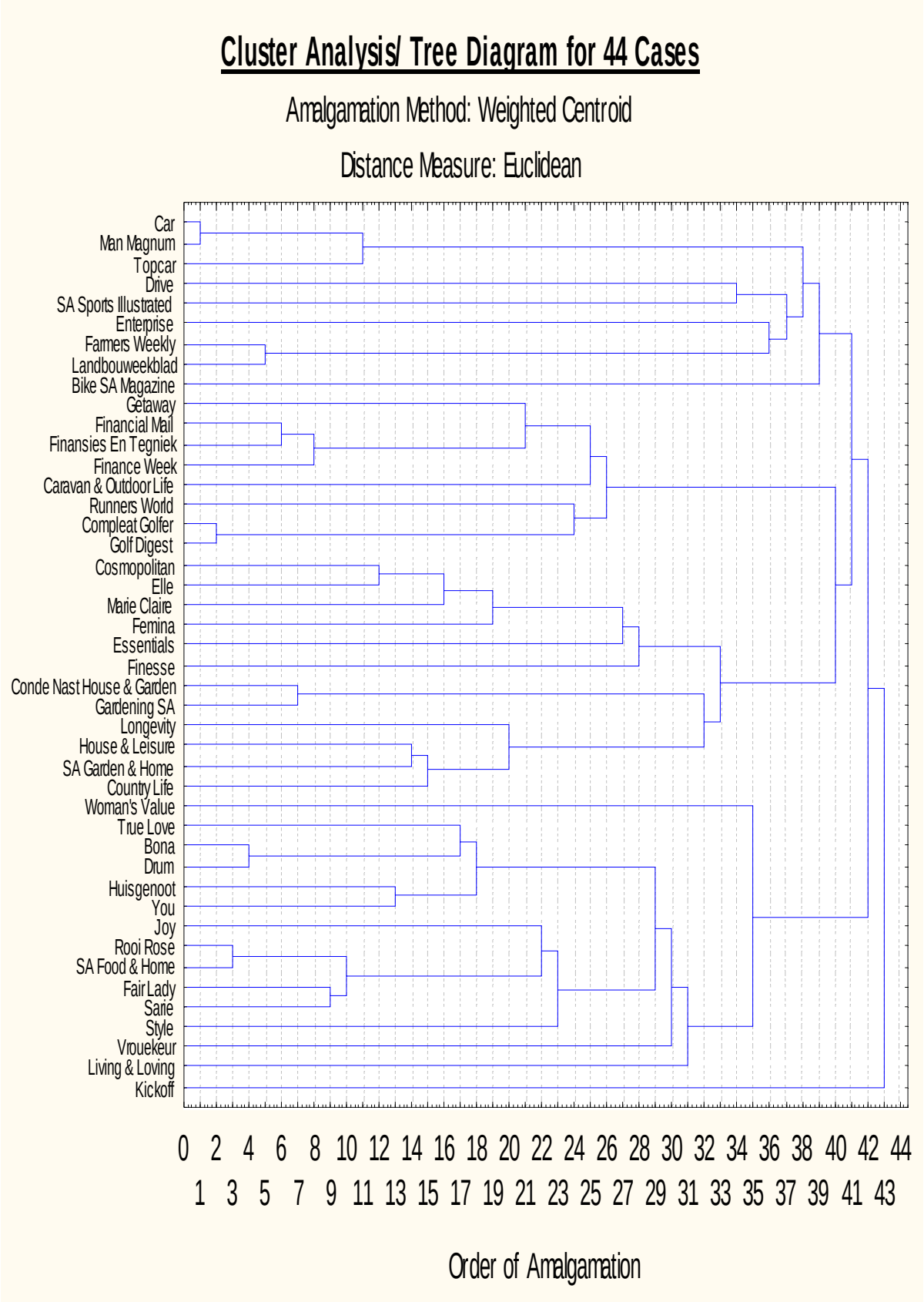
	Bona	Drum	Elle	Fair Lady	Femina	Finance Week	Financial Mail	Cosmo-politan	Marie Claire
Bona	0	0.13	0.74	0.69	0.94	1.41	1.47	0.73	0.84
Drum	0.13	0	0.69	0.72	0.95	1.4	1.45	0.7	0.82
Elle	0.74	0.69	0	0.46	0.48	1.06	1.11	0.21	0.21
Fair Lady	0.69	0.72	0.46	0	0.28	0.98	1.05	0.35	0.36
Femina	0.94	0.95	0.48	0.28	0	0.85	0.91	0.36	0.29
Finance Week	1.41	1.4	1.06	0.98	0.85	0	0.08	0.88	0.96
Financial Mail	1.47	1.45	1.11	1.05	0.91	0.08	0	0.93	1.01
Cosmo-politan	0.73	0.7	0.21	0.35	0.36	0.88	0.93	0	0.19
Marie Claire	0.84	0.82	0.21	0.36	0.29	0.96	1.01	0.19	0

By noting the point at which specific clusters join, we can construct a tree diagram similar to the ones included in the text and presented below. Clusters that only amalgamate at relatively high linkage distances are assumed to be relatively different – more distant relatives to use the family analogy. Alternative amalgamation rules can be used. The distance between clusters, for example can be calculated on the basis of a hypothetical representative member, or centroid. The centroid is simply an average point in multidimensional space (Statistica Electronic Manuel, 2004). Because the centroid of a cluster changes as clusters are joined together, amalgamation is based on joining clusters with the closest centroids one at a time rather than an absolute linkage distance (which would be non-monotonic).

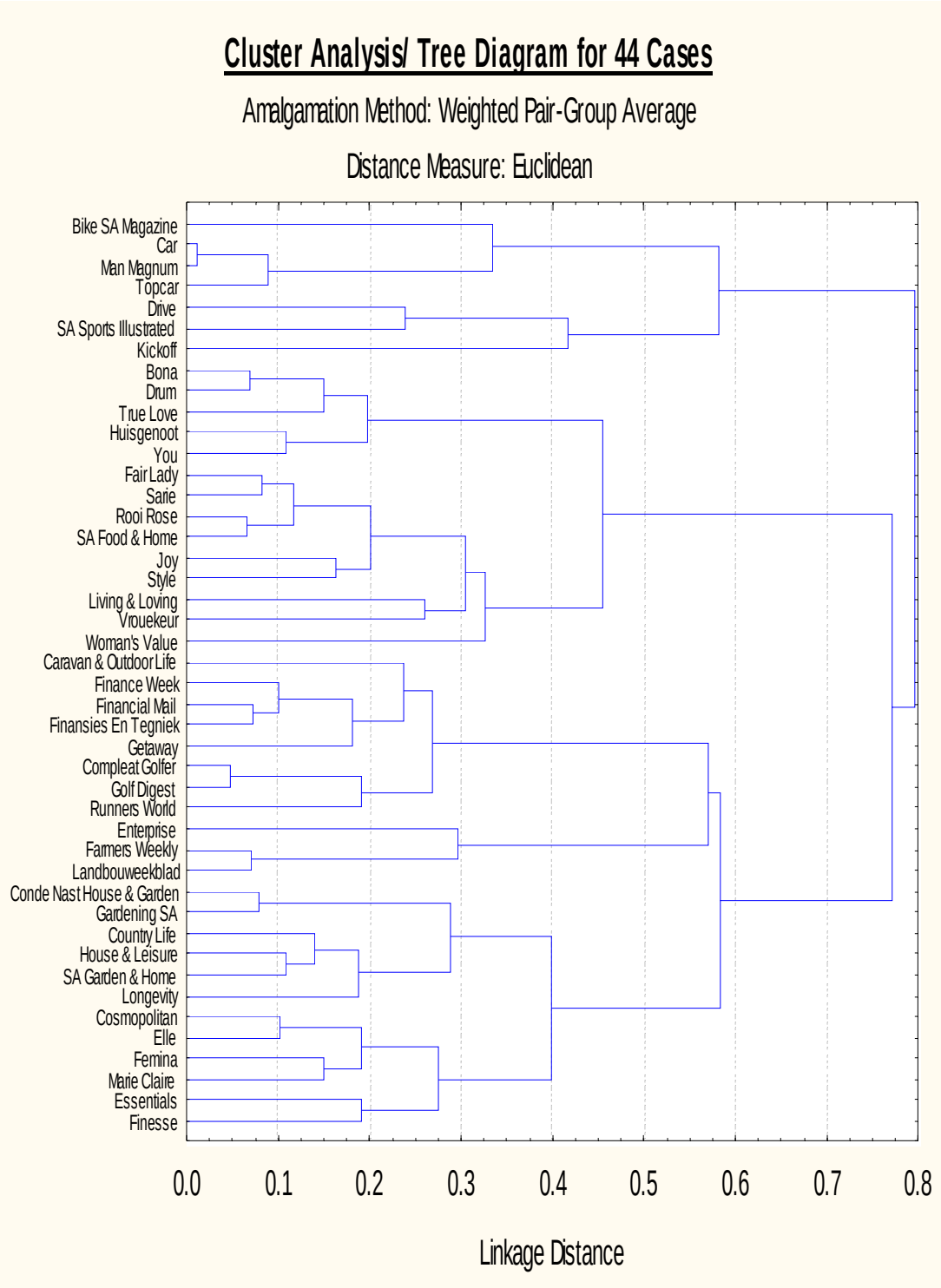
As can be seen below, the centroid approach gives us a snapshot of the market that is similar in many ways to the weighted pair-group method, but is perhaps more intuitively convincing when it comes to the treatment of higher level clusters. At lower levels of amalgamation however, the picture is almost identical to the pair-group method. Finally, a cluster analysis is included that follows the same construction methods as the figure presented in the text, but which excludes age in the calculation of the distance measure. As can be seen there are slight differences. Again, the clustering at higher levels is perhaps more convincing than the figure presented in the main body of this text. The discrepancies that result from using different amalgamation rules and distance measures are not catastrophic. What is perhaps most surprising is the relative stability of the picture that emerges despite using different inputs and constructive techniques.

2 The predefined Euclidean distance between two clusters at which point the clusters are joined into one larger cluster.

Tree Diagram Constructed Using Centroid Method



Tree Diagram Constructed Using Only Education, Income and Gender



Appendix 3:
Correlation Means of Dependent Variables

	CIRCULATION	UNIVERSITY GRADUATES	FEMALE READERS	BLACK READERS	AFRIKAANS	WEEKLY DUMMY	INCOME	READERS PER COPY	AFFORDABILITY	READERS UNDER 28	GENDER INTENSITY
CIRCULATION	1.00	-0.35	0.32	0.01	0.29	0.25	-0.33	-0.07	-0.05	-0.04	-0.19
UNIVERSITY GRADUATES	-0.35	1.00	-0.15	-0.37	0.01	0.12	0.74	-0.45	0.40	-0.49	-0.14
FEMALE READERS	0.32	-0.15	1.00	-0.05	0.11	-0.08	-0.24	-0.18	-0.11	-0.23	-0.16
BLACK READERS	0.01	-0.37	-0.05	1.00	-0.42	-0.04	-0.73	0.72	-0.54	0.52	-0.16
AFRIKAANS	0.29	0.01	0.11	-0.42	1.00	0.35	0.04	-0.28	0.42	-0.38	-0.06
WEEKLY DUMMY	0.25	0.12	-0.08	-0.04	0.35	1.00	-0.02	-0.10	0.62	-0.23	-0.30
INCOME	-0.33	0.74	-0.24	-0.73	0.04	-0.02	1.00	-0.66	0.55	-0.42	0.11
READERS PER COPY	-0.07	-0.45	-0.18	0.72	-0.28	-0.10	-0.66	1.00	-0.50	0.58	0.07
AFFORDABILITY	-0.05	0.40	-0.11	-0.54	0.42	0.62	0.55	-0.50	1.00	-0.46	-0.08
READERS UNDER 28	-0.04	-0.49	-0.23	0.52	-0.38	-0.23	-0.42	0.58	-0.46	1.00	0.13
GENDER INTENSITY	-0.19	-0.14	-0.16	-0.16	-0.06	-0.30	0.11	0.07	-0.08	0.13	1.00

Appendix 4

Analysis of Panel

Unconditional Analysis Of Variance			
Source	Variation	Degrees of Freedom	Mean Square
Between	8.80040E+009	54	1.62970E+008
Residual	2.08907E+008	165	1.26610E+006
Total	9.00931E+009	219	4.41384E+007

Test Statistics for the Classical Model				
No.	Model	Log-Likelihood	Sum of Squares	R-Squared
(1)	Constant only	-2240.24	.900930D+010	.0000
(2)	Group effects only	-1826.18	.208907D+009	.9768
(3)	Ind. variables only	-2064.25	.181920D+010	.7980
(4)	Group and Ind. Variables	-1814.00	.187010D+009	.9792

Hypothesis Tests		
Model	Likelihood Ratio Test P-Value	F-Test P-Value
(2) vs. (1)	.0000	.0000
(3) vs. (1)	.0000	.0000
(4) vs. (1)	.0000	.0000
(4) vs. (2)	.0414	.2369
(4) vs. (3)	.0000	.0000

Appendix 5

Descriptive Statistics of Data

	Valid N	*Mean*	*Median*	*Minimum*	*Maximum*	*Std.Dev.*
CIRCULATION ('000)	220	64.53	41.08	10.01	395.37	63.87
UNIVERSITY	220	9.9	8.88	0.98	29.17	5.6
FEMALE	220	50.1	56.01	13.04	84.88	21.44
BLACK	220	31.31	26.5	1.64	98.46	23.6
AFRIKAANS	220	0.15	0	0	1	0.35
WEEKDUM	220	0.18	0	0	1	0.38
ADVERTISING RATE	220	15506	13950	4002	37400	6413
MONTHLY MEDIAN INCOME (R'000)	220	6.52	6.54	1.22	11.03	2.1
READERS PER COPY	220	9.1	7.1	2.77	40.64	5.81
AFFORD-ABILITY	220	552	536	186	1324	213
GENDER HOMOGENEITY	220	5914	5792	5000	7732	740