ARBITRON

Radio's ROI in Marketing Mix Models
Results of The Radio Industry's Two-Year, Multi-Stage Study

Conducted by:

Sequent partners

Sponsored by:

ARBITRON   DG DIALGLOBAL   PREMIERE RADIO NETWORKS

Overview

For the past two years, radio industry leaders have collaborated to address the complex challenge of developing new radio data for marketing mix models. Upgraded and more granular radio data, which are more appropriate for the models, were developed and field-tested against previous radio data in three real-world marketing mix models.

The tests provided solid evidence that more granular and precise radio audience data can help improve the evaluation of radio's performance—radio's ROI improved from 27%-78% in three modeling case studies. In addition, the new data produced more statistically significant results, as measured by each model's r^2, a statistic indicating the overall model quality, and the t-statistic, indicating the confidence around the model's estimate of radio's power to drive sales. These results suggest that radio's contribution to sales can be better reflected with more granular data.

This paper outlines the process and learning throughout the project and shares best practices for improving radio data for marketing mix models. It also describes the impact on model quality and the model's estimates of radio's ROI.

Background

Marketing mix models are used by most major advertisers—60%-70%, according to the ANA. These advertisers use models to understand how each element of their marketing mix contributes to sales. Those results are often used to allocate ad spend based on how product sales are driven by different combinations of media. Historically, radio data have not been sufficiently granular to draw an adequate connection between advertising and sales results. Due to this disconnect, many people believe that radio has not gotten its fair share of advertising dollars.

For the past two years, a group of radio industry leaders and agency research advisors, along with Arbitron and Sequent Partners (Figure 1) have collaborated to develop best practices in marketing mix measures for radio. The goal of the initiative was to determine how to bring in more timely and granular data and quantify the impact they will have on radio's performance in the models.

Figure 1: Sponsors and Advisors

| Sponsors		Advisors
Arbitron	**Premiere Networks**	Graeme Hutton, Universal McCann
Carol Hanley	Len Klatt	Joseph Abruzzo, MPG North America
Bill Rose	Leslie Wood	Christine Fontana, MediaVest USA
Neal Bonner		Jon Cogan, OMD
	Sequent Partners	Debbie Donhoe, Mediavest
Dial-Global	Jim Spaeth	Sam Sotiriou, Zenith Media Services
Roby Wiener	Alice K. Sylvester	Jen Rhodes, Starcom Worldwide
Charles Steinhauer		
Paul Bronstein		

We anticipated that more granular data would improve radio's outcome in marketing mix models because we had observed similar results with the magazine industry. When weekly, issue-specific, DMA-level TRPs replaced six-month national averages, magazines' contribution to sales increased by 6%-12% (Source: Mediavest). We wanted to learn if the outcome would be similar for radio.

Phase I. Current Practices—Interviews

The study began with a benchmarking study of 25 advertisers, agencies, and modelers to assess their perceptions of radio and its ability to drive sales. The interviews confirmed that radio is often included in marketing mix models, but that the data inputs are highly variable in terms of granularity and quality.

The interviews also confirmed that radio experiences data challenges in modeling. In the ideal data set for modeling purposes, the data dimensions must match how advertisers measure their sales results—generally by week and DMA. Once aligned, the models assess the ups and down of marketing and media factors (media levels represented by TRPs) with sales outputs. If sales go up when media levels go up, media will be credited with those sales. Averages flatten the natural ups and downs of real-world media delivery and make it difficult to detect the alignment of the marketing/media stimuli with the sales outcomes (see Figure 2 below).

Figure 2: How Do the Models Work?
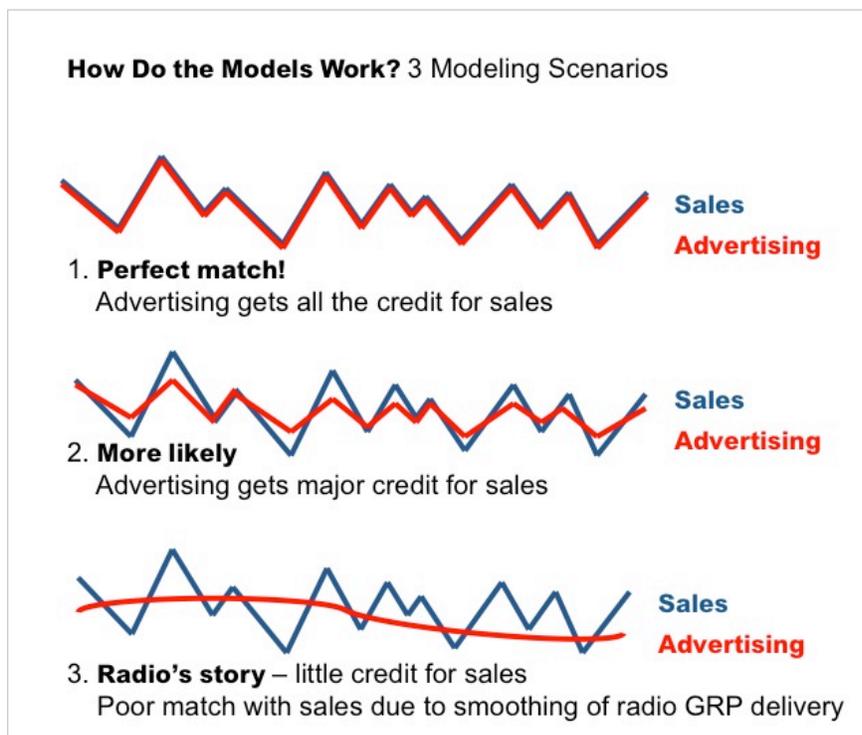
For radio, this means GRP delivery for each commercial on a given day and quarter-hour, rather than multiweek daypart averages and actual sales reporting periods and markets rather than broadcast calendars and Metro areas are required.

The interviews revealed that radio is disadvantaged in the arduous processes of generating media data for the models. Radio GRP data can be difficult to retrieve, and inexperienced professionals are often tasked with pulling the data. On the other side of the desk, modelers tend to use the data they receive from the agencies without question for fear of slowing down the process. Modelers report using a variety of different types of radio data in the models—expenditure data, as planned weight, as bought, and rarely actual TRPs. They might be national or local data. There are no standard practices or quality standards. As a result, the quality of radio data inputs into models is highly variable.

The taskforce concluded that there is a significant need for an efficient industry standard—a best-practice radio data stream specifically for modelers.

The Prevalence of Radio in Marketing Mix Models

We found that modelers do, in fact, have a lot of experience evaluating radio. There is no lack of education or bias in working with the medium. As a general rule, if radio was in the media plan, it was included in the subsequent marketing mix model. Modelers are determined to include all marketing and media inputs and go to great lengths to capture even difficult-to-measure media.

Radio is strong with those advertisers who allocate significant weight to the medium. In these cases, the advertisers are able to get a read on radio's ability to drive sales and deliver an effective ROI. However, it became clear in the interviews that not all radio plans are strong enough to produce a measurable effect in the models—the weight levels were simply too low. This becomes very important because success in the marketing mix models can lead to a larger role for radio in the media plan. For those without adequate levels of radio, there are few data points and few positive results, so radio has an uphill battle being considered for the marketing mix.

One of the most important takeaways from the interviews was that the radio data being provided today to modelers are inconsistent, imprecise, and sometimes inaccurate. We also learned that it is labor-intensive for the agencies and the process of pulling data can be very slow. A new solution was in order.

Identifying New Radio Data for Modeling

After thoroughly digesting the results of the benchmarking study, the team set out to identify approaches to bring more timely and granular radio data into the modeling process.

The steps we took to develop new data specs were:

1. Evaluating commercial monitoring options
2. Determining how to integrate ratings with commercial occurrence data
3. Addressing differences in Metro vs. DMA geographic reporting

Commercial Monitoring

In order to mirror the granularity and specificity of other media data in models, the team knew it was important to connect individual spots and their exact audiences. The team interviewed and evaluated several options in commercial monitoring services. Media Monitors was chosen during this project because of its breadth, coverage, and accuracy.

Media Monitors covers radio stations with 2+ share in 85 radio markets. They monitor ads that are 30 seconds or longer that air 2+ times in the course of eight days. This represents about 90%+ of advertising activity. We note that some advertisers use nontraditional approaches such as live reads, sponsorships, integrated marketing, etc. Monitoring the full range of radio advertising activity will make the models even more precise and presumably more favorable towards radio. However, given the prevalence of the standard 30+ second recorded ad, we proceeded with this approach to commercial monitoring with confidence knowing that it would provide substantially improved breadth, coverage, and accuracy for 90+% of the radio advertising activity.

Audience Exploration

PPM Data

Previously, Arbitron radio data from the Diary were used to feed the models. Radio's audience, as measured by the diary, is reported quarterly as a three-month average. These average data tend to hide actual variations in Radio's weight and presence that might be affecting sales. Most other media are reported as they run. Furthermore, the radio diary data for a given day and quarter-hour was based on one-twelfth of the sample size in a given survey making it inadvisable (due to sampling error) to narrow the audience data to a given day for the purpose of aligning it with weekly sales data.

PPM data are particularly well suited to producing audience estimates for a given day/quarter because they are based on a panel, which means the sample size for a week or given day is substantially larger than the Diary service. Using specific day/quarter-hour data as the input for audience to the model adds a great deal of precision and granularity, without producing a totally different set of radio audience data (e.g., minute-level audience) from those currently used for planning and buying.

Arbitron and Media Monitors have worked together for several years on a range of services (e.g., Audience Reaction™ and mScore™) and research projects (e.g., "What Happens When the Spots Come On: 2011 Edition") that link PPM data with Media Monitors data.

The combination of the added granularity enabled by PPM and the substantial prior experience both companies have in combining their data made using Media Monitors and PPM data the optimal solution.

To recap, the approach we took to linking commercial occurrence data to audiences involved taking the exact date, quarter-hour, and station on which a commercial ran, as determined by Media Monitors, and linked it to the PPM audience data for the same exact date, quarter-hour, and station.

PPM markets account for over half of the population in the U.S. and a substantially greater share of the ad spend. Therefore we believe starting with the PPM markets represents a substantial step forward in creating more granular and more precise radio data for modeling in the markets where they will have the greatest immediate impact.

Diary Data

Audience levels as measured by diary have been seen to differ from those measured with the passive PPM technology. Twelve-week averages mask fluctuations in week-in-year and day-in-week listening flattening the differences in actual delivery, making it difficult to align with weekly sales data. The "flatness" of the Diary data was potentially reducing marketing mix models' ability to infer radio's influence on sales.

We explored a variety of data transformation approaches with the goal of producing Diary data for models that would be superior to the Diary data being used today. These included steps to adjust the Diary data to look more like PPM. Ultimately, a case could not be made that the adjusted estimates would be materially superior to the continued use of currency Diary estimates presently used in the models. Furthermore, Arbitron determined that it would have been impractical to implement PPM-adjusted Diary estimates. Therefore, the initial upgrade in more granular audience ratings data for marketing mix models will start with PPM markets. Marketing mix models for Diary markets will continue to use the currency estimates.

Metro-to-DMA Conversion

The final data translation required understanding and accounting for differences in geography. Radio audiences are reported by Metro areas, while DMAs are the most frequently used geographic units in models. In PPM markets, over 60% of the population in each DMA is covered by the Metro areas that fall within it. The team recommended applying Metro impressions to the DMA in which they are found and re-expressing them as DMA TRPs based on the the population from the DMA.

Best Practices in Model-Ready Radio Data

This rigorous analytic phase produced a solid solution for radio in marketing mix models. The approach was vetted through Arbitron, Media Monitors, the rest of the sponsors, as well as the agency advisory committee. A thorough analysis of all possible variables led to a solution in which we have great confidence.

To recap, here is what the team considers best practices and "model-ready" radio data:

- Use passive electronic commercial occurrence measurement from Media Monitors to provide more coverage, depth and accuracy than present manual methods
- Use PPM AQH ratings for each spot, linking to the exact quarter hour, day and station as measured by Media Monitors. These markets represent more than half of the population and a substantially larger percent of ad spend
  » In Diary markets, continue using the existing currency estimates until better options are developed.
- Metro impressions data are converted to DMA TRPs.

Putting the New Data to the Test

The new more granular radio data were provided to modeling companies who volunteered to test the impact of the new data—Analytic Partners, Millward Brown, and MediaBrands. These companies were asked to identify a case with a sufficient level of radio in the media mix, replace existing radio data with new data, leave the rest of the model structure intact, and determine the difference in the model outcome relative to radio's contribution. They were asked to report:

- Model improvement
- Change in sales contribution of advertising
- Change in sales contribution of radio
- How original media allocation recommendations would change

We were fortunate to test the new data in a variety of product categories and radio plans:

- Fast Food Brand: 3 Markets, 4Q 2010, modeled by Millward Brown
- Candy Brand: National Campaign, 2010, modeled by Analytic Partners
- Entertainment Brand: 4 Markets, Summer 2010, modeled by MediaBrands

Re-Modeling Results

The tests revealed that more granular radio audience data can improve the evaluation of radio's performance. Radio's ROI improved from 27%-80% in three real-world modeling case studies. In addition, the new data produced more statistically significant results, as measured by each model's r^2, a statistic indicating the overall model quality, and the t-statistic, indicating the confidence around the model's estimate of radio's power to drive sales. These terms may be unfamiliar to nonstatisticians. In laymen's terms, ROI increased and the modelers' ability to read the effects of radio also increased.

Case 1: Fast Food

Millward Brown selected a model it had created for a fast food client in 2010. Radio aimed at adults 18-49 ran from September-December that year. Other background is confidential. Millward Brown chose this case for the project because there was a sufficient amount of radio in the three markets it originally modeled.

It is important to note that the Millward Brown modeling practice is different from the typical marketing mix modeling approaches in that it attributes marketing stimuli to improvements in brand metrics rather than sales. They determine the extent to which components of the advertising mix drive key performance indicators—measures of brand strength like awareness, communication of the brand's tagline, and strategic messages, such as the brand has high quality and the food tastes good.

The first indication of the impact of the new data was that the delivery of the radio weight was much more variable. Figure 3 demonstrates that the pattern of weekly TRPs initially used by the modelers was identical in the three markets suggesting the TRPs were planned rather than "as ran." As Figure 4 reveals, there were greater differences in weight levels between markets when commercial monitoring data (exact day, time, and station) were introduced. This suggests the new data solution already adds granularity to the model by using actual weight in the market rather than planned TRPs.
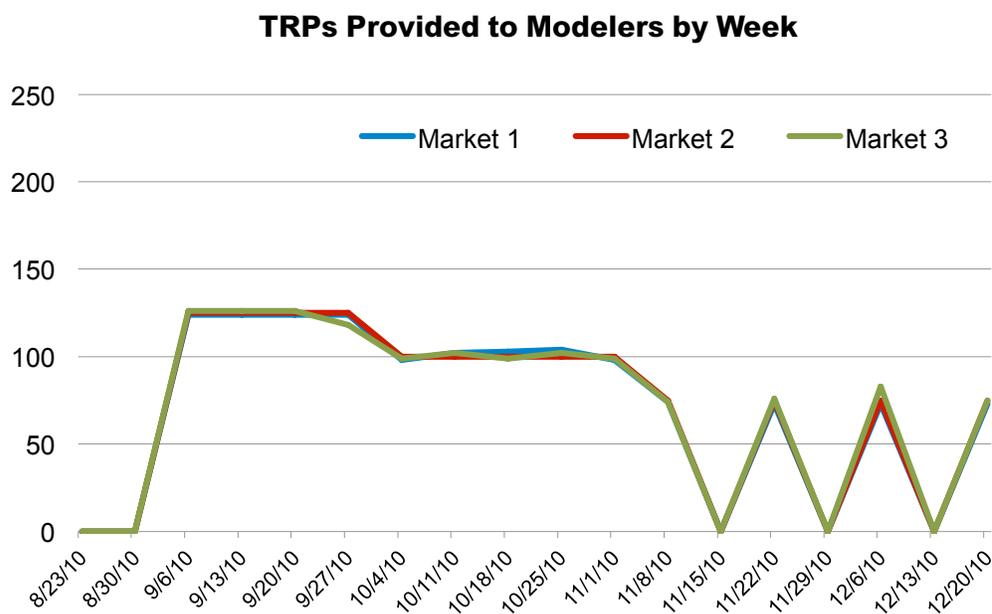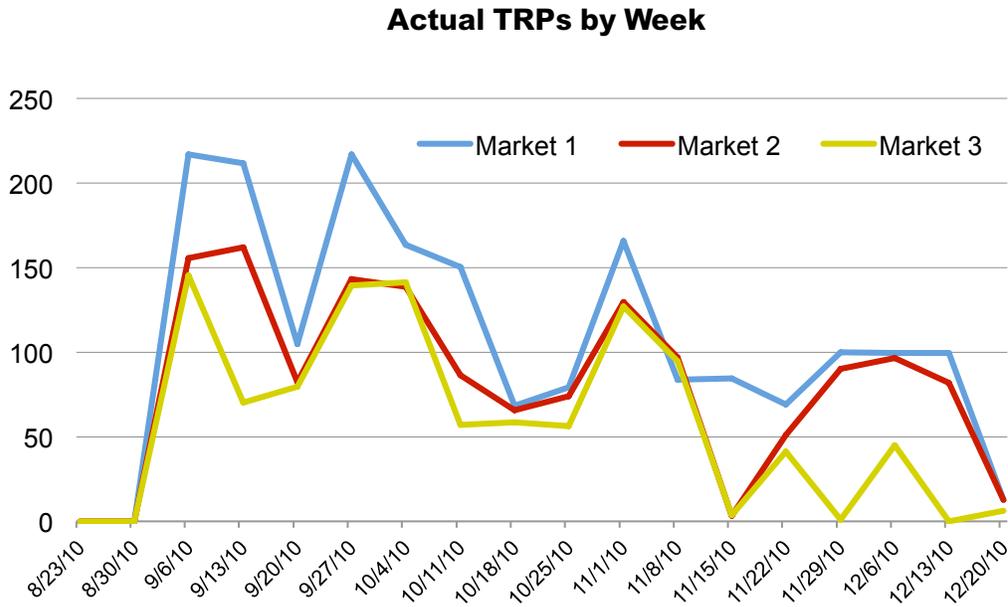
Figure 3: Three-Market Radio Plan by Week

Figure 4: Three-Market Radio Actual by Week

Actual TRPs by Week

When the actual TRPs were put into the model, Millward Brown found that the new data had a positive impact on radio's ROI.

New data improved radio's ROI by 78% for the fast food brand, as seen in the chart below, Figure 5.

Figure 5

ROI and Effectiveness Measures	Model Improvement/ Change in Radio Contribution (%)	
Ad ROI Change – Awareness	**+80%**	(1.45 to 2.61)
Radio ROI Change	**+78%**	(.09 to.16%)
Radio Contribution to Tagline Recognition	**+80%**	(.34% to .60%)
Radio Contribution To "Has High Quality" Brand Attribute	**+10%**	(.20% to .22%)
Radio Contribution To "Has Great Taste" Brand Attribute	**+192%**	(.13% to .38%)

Yes, radio's contribution to brand awareness was relatively low in the first place, 0.09%, but it improved significantly to 0.16%. Millward Brown was pleased with the results of the test and remarked, "Our recommendation to capitalize further on radio as part of the mix would remain, but we would have been on stronger footing to make the recommendation" (Bill Pink, Senior Partner, Client Solutions, Millward Brown).

Case 2: Candy Brand

The second re-modeling case was conducted by Analytic Partners and involved a brand of candy. The national radio plan involved a 30-second brand commercial plus a 10-second promotional announcement. Radio ran throughout August and September 2010.

In this case, since radio was found to have a positive ROI both before and after the remodeling exercise, there was no significant change in radio's contribution. However, as Figure 6 demonstrates, the more granular radio data produced a more statistically significant modeling result, which is also important.

The chart shows the significance of the model increasing from 92% to 97% and the t-statistic moving from a relatively weak 1.69 to a stronger 2.23. Why is this important and what does it mean? T-statistics are measures of the strength of the model in predicting the contribution of each element of the mix. The goal of modeling is to find a model that best fits previous years' sales in order to predict next year's sales. The t-statistic is the gauge of the strength of that model and influences the advertiser's confidence in the models findings. As a rule of thumb, model variables with a t-statistic of 2 or greater are considered statistically reliable and, from a practical perspective, trustworthy. Therefore, in this re-modeled case study, the reliability of the model was improved with the new data.

After the analysis, Eugenia Zeibig of Analytic Partners observed: "The added granularity of the new data enables further analysis [of] the effective use of radio, [allowing us to talk about] Promotional vs. Equity Radio."

Figure 6

Radio Contribution to Sales	Before	After
Significance	92%	97%
T-Statistic	1.69	2.23

Case 3: Entertainment Venue

MediaBrands contributed the third re-modeling case; an entertainment venue. This marketer is a heavy user of radio and uses it to drive traffic and ticket sales. Radio aimed at adults 25-54 ran from December 2009-August 2010 in four large markets. Other details about the media plan and marketing situation are confidential.

MediaBrands re-modeled 2010 and 2009. They undertook extensive analyses of the four markets and Art Thomas concluded, "The improved radio data resulted in improved radio ROI in three out of four markets."

As Figure 7 shows, the change in radio's contribution to ticket sales (radio's ROI) ranged from +14% to +63%, demonstrating that the more granular data increase the readability of radio's performance. On average, then, radio's contribution to sales increased 27% on average for this particular case compared with using the less granular data.

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In addition, almost every market had an increase in the t-statistic, with the exception of Market A. The t-statistic is the measure that gives the modelers confidence that the model will predict future outcomes with greater certainty. In summary, this case demonstrates the new radio data can improve the readability of radio's ROI and help improve statistical reliability.

Figure 7

Changes in Radio's Contribution to Ticket Sales	2009	2010	T-Stat
Top 10 Market A	-1%	+27%	1.6 to 1.5
Top 10 Market B	+17%	+14%	2.8 to 5.4
Top 10 Market C	+63%	+40%	2.7 to 5.8
Top 10 Market D	+43%	+27%	1.6 to 2.7

Next Steps

Arbitron already makes model-ready granular radio data available as a custom data set. The company is also working actively with other parties to make this new more granular model ready data more widely available with easier accessibility.

Conclusion

After two years of intense study and experimentation, we are gratified to see that more precise radio data can improve our ability to evaluate radio's contribution in marketing mix models.

Radio's ROI improved from 27%-78% in three real-world modeling case studies.

The strong results from these tests suggest the industry will benefit from the added effort of developing more granular radio data for modeling. The results should also encourage marketers to increase their use of radio, given increased readability, effectiveness, and a strong base of loyal consumers.

About Arbitron Inc.

Arbitron Inc. (NYSE: ARB) is an international media and marketing research firm serving the media–radio, television, cable, and out-of-home; the mobile industry; as well as advertising agencies and advertisers around the world. Arbitron businesses include: measuring network and local market radio audiences across the United States; surveying the retail, media, and product patterns of U.S. consumers; providing mobile audience measurement and analytics in the United States, Europe, Asia, and Australia; and developing application software used for analyzing media audience and marketing information data.

The Company has developed the Portable People Meter™ (PPM™) and the PPM 360™, new technologies for media and marketing research.

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