BENCHMARKING READERSHIP LEVELS IN THE NEW STUDY OF MEDIA AND MARKETS TO THE SURVEY OF AMERICAN READERSHIP

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The concept of adjusting levels collected in one study to those attained in another "benchmark" study is well established. In broadcast measurement, diary data are adjusted to metered levels and in the United Kingdom magazine readership ratings collected in the TGI study are conformed to the National Readership Study. The process by which readership levels in the new Study of Media and Markets (SMM) are benchmarked to the levels obtained in the Survey of American Readership (SAR) is quite simple and straightforward. The actual probabilities of reading within frequency groups obtained in the SAR are transferred to the corresponding frequency groups within the SMM and then modified to attain the average audience and turnover achieved in the SAR[1].

In the example below, we show exactly how the process is carried out. In the first step, the responses to three questions in the SAR: screening in the last six months, frequency of reading, and recent reading (last publication period) are used to establish the actual probability of recent reading within each frequency of reading group (Table 1). Next, the actual probabilities of reading from the SAR are applied to the corresponding frequency of reading groups in the SMM (Table 2). Finally, these probabilities are weighted (Tables 3, 4 and 5) so that the average issue and two issue audience levels are the same in the SMM as those in the SAR.

[1] The basic notion of using actual probabilities of reading for specific frequency groups as a means of assuring consistency of readership from one sample to another was first suggested by Dr. Valentine Appel in the early 1980's.

An Example

For the purpose of this example, the universe may be total adults, total males, males age 18-49 or any other demographic cell. The actual demographic cells used in benchmarking may vary by magazine, depending upon the demographic composition and the number of respondents screening in to each magazine.
Table 1 contains the relevant SAR data for this example. For each of six frequency groups and total, we have:

A the percent of the universe in that group

B the percent of the group claiming readership in the publication period or the probability of being in the average issue audience

C the percent of the group reading at least one of two issues or the probability of being in the two issue audience. This number is calculated using the formula:

$C = 1. - (1.-B)^2$
for the "3 of 4" group, the table shows
$0.8631 = 1. - (1. - 0.6300)^2$

D the contribution of that group to the total average issue audience, calculated by:

$D = A \times B$
for the "3 of 4" group, the table shows
$0.0126 = 0.0200 \times 0.6300$

E the contribution of that group to the total two issue audience, calculated by:

$E = A \times C$
for the "3 of 4" group, the table shows
$0.0173 = 0.0200 \times 0.8631$

F the contribution of that group to the total variance, calculated by:

$F = A \times (B - MB)^2$
where MB is the mean of the average issue probabilities (the total average audience).
for the "3 of 4" group, the table shows
$0.005202 = 0.0200 \times (0.6300 - 0.120000)^2$

Table 1

		Within Group		Contribution to Total		
Frequency Group	% of Universe	% Average Audience	% Two Issue Audience	Average Audience	Two Issue Audience	Variance
Non-screen	70.00%	0.00%	0.00%	0.00%	0.00%	0.010080
<1 of 4	12.00%	6.00%	11.64%	0.72%	1.40%	0.000432
1 of 4	3.00%	22.00%	39.16%	0.66%	1.17%	0.000300
2 of 4	5.00%	40.00%	64.00%	2.00%	3.20%	0.003920
3 of 4	2.00%	63.00%	86.31%	1.26%	1.73%	0.005202
4 of 4	8.00%	92.00%	99.36%	7.36%	7.95%	0.051200
Total	**100.00%**	N/A	N/A	**12.00%**	**15.45%**	**0.071134**
	A	B	C	D	E	F

Table 2 contains the percent of universe data for each frequency group from the SMM (column A) combined with the probability or percent average audience data from the SAR (column B). As the table shows, after performing the calculations described above, the average audience, two issue audience and variance do not match those calculated in Table 1.

Table 2

		Within Group		Contribution to Total		
Frequency Group	% of Universe	% Average Audience	% Two Issue Audience	Average Audience	Two Issue Audience	Variance
Non-screen	69.00%	0.00%	0.00%	0.00%	0.00%	0.009936
<1 of 4	11.00%	6.00%	11.64%	0.66%	1.28%	0.000396
1 of 4	5.00%	22.00%	39.16%	1.10%	1.96%	0.000500
2 of 4	5.00%	40.00%	64.00%	2.00%	3.20%	0.003920
3 of 4	3.00%	63.00%	86.31%	1.89%	2.59%	0.007803
4 of 4	7.00%	92.00%	99.36%	6.44%	6.96%	0.044800
Total	**100.00%**	N/A	N/A	**12.09%**	**15.98%**	**0.067355**
	A	B	C	D	E	F

Table 3 shows the combined data after making a simple proportional adjustment to the average audience probabilities. The adjustment factor is calculated by dividing the total SAR average audience shown in Table 1 (column D) by the total SMM average audience shown in Table 2 (column D). In this example the adjustment factor is

0.1200 / 0.1209 = 0.992555831

Each average issue probability (column B) is then multiplied by this factor creating adjusted probabilities. The results of applying these adjusted probabilities is a total average audience for the SMM that matches the average audience of the SAR, but a total two issue audience that does not.

Table 3

		Within Group		Contribution to Total		
Frequency Group	% of Universe	% Average Audience	% Two Issue Audience	Average Audience	Two Issue Audience	Variance
Non-screen	69.00%	0.00%	0.00%	0.00%	0.00%	0.009936
<1 of 4	11.00%	5.96%	11.56%	0.66%	1.27%	0.000402
1 of 4	5.00%	21.84%	38.90%	1.09%	1.95%	0.000484
2 of 4	5.00%	39.70%	63.64%	1.99%	3.18%	0.003837
3 of 4	3.00%	62.53%	85.96%	1.88%	2.58%	0.007660
4 of 4	7.00%	91.32%	99.25%	6.39%	6.95%	0.044036
Total	**100.00%**	N/A	N/A	**12.00%**	**15.92%**	**0.066355**
	A	B	C	D	E	F

As a matter of policy, our benchmarking implementation will never allow any readership in the non-screen group. In order to benchmark the two issue audience without assigning readership to this group, average audience and variance need to be calculated for the five frequency groups that are free to change. Table 4 shows these new numbers in the last two columns, which will be referred to as columns G and H respectively. The 38.71% in the total row of the free average audience column is the mean average audience probability of the five free frequency groups, not the total average audience. It is calculated by summing the five average audiences in column G and dividing that sum by the sum of the universe percents in column A for the free frequency groups. In this example 38.71% = 12.00% / 31.00%

Table 4

Frequency Group	% of Universe	Within Group % Average Audience	Within Group % Two Issue Audience	Contribution to Total Average Audience	Contribution to Total Two Issue Audience	Free Average Audience	Free Variance
Non-screen	69.00%	0.00%	0.00%	0.00%	0.00%		
<1 of 4	11.00%	5.96%	11.56%	0.66%	1.27%	0.66%	0.011801
1 of 4	5.00%	21.84%	38.90%	1.09%	1.95%	1.09%	0.001424
2 of 4	5.00%	39.70%	63.64%	1.99%	3.18%	1.99%	0.000005
3 of 4	3.00%	62.53%	85.96%	1.88%	2.58%	1.88%	0.001702
4 of 4	7.00%	91.32%	99.25%	6.39%	6.95%	6.39%	0.019371
Total	**100.00%**	N/A	N/A	**12.00%**	**15.92%**	**38.71%**	**0.034304**
	A	B	C	D	E	G	H

The final adjustment is accomplished in two steps. Step one calculates a constant adjustment factor to be used with each free frequency group in step two. The factor is calculated using this formula:

> factor = SQUARE ROOT ((variance from Table 1 - variance from Table 3 + free variance) / free variance)

For our example the numbers are:

> 1.067385288 = SquareRoot ((0.071134 - 0.066355 + 0.034304) / 0.034304)

The second step is to adjust the average audience probability for each free frequency group using this formula:
probability = MG + factor x (B - MG)
where MG is the mean average audience probability from Table 4 and B is the average audience probability for each free frequency group, also from Table 4. The numbers for the less than 1 of 4 frequency group are:
0.037481742 = 0.3871 + 1.067385288 x (0.0596 - 0.3871)

Table 5 shows the results of the final adjustment.

Table 5

Frequency Group	% of Universe	Within Group % Average Audience	Within Group % Two Issue Audience	Contribution to Total Average Audience	Contribution to Total Two Issue Audience	Variance
Non-screen	69.00%	0.00%	0.00%	0.00%	0.00%	0.009936
<1 of 4	11.00%	3.75%	7.36%	0.41%	0.81%	0.000749
1 of 4	5.00%	20.70%	37.11%	1.03%	1.86%	0.000378
2 of 4	5.00%	39.77%	63.72%	1.99%	3.19%	0.003856
3 of 4	3.00%	64.14%	87.14%	1.92%	2.61%	0.008155
4 of 4	7.00%	94.86%	99.74%	6.64%	6.98%	0.048060
Total	**100.00%**	N/A	N/A	**12.00%**	**15.45%**	**0.071134**
	A	B	C	D	E	F