

Mind-Set Metrics in Market Response Models: An Integrative Approach

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WEB APPENDIX

Technical Appendix A – VARX Specification

Specification of VARX Model

We estimate a 15-equation VARX model per brand, where the endogenous variables are sales (S), the four marketing mix variables of average retail price (PRI), promotion (PRO), advertising (ADV), distribution (DIS), the three mindset variables of advertising awareness (AWA), brand consideration ($CONS$), brand liking (LIK) and the seven corresponding competitive variables, prefixed with (C) to denote competition. In full notation the model given is by,

$$\begin{bmatrix} S_t \\ PRI_t \\ PRO_t \\ ADV_t \\ DIS_t \\ AWA_t \\ CONS_t \\ LIK_t \\ CPRI_t \\ CPRO_t \\ CADV_t \\ CDIS_t \\ CAWA_t \\ CCONS_t \\ CLIK_t \end{bmatrix} = \begin{bmatrix} \alpha_S \\ \alpha_{PRI} \\ \alpha_{PRO} \\ \alpha_{ADV} \\ \alpha_{DIS} \\ \alpha_{AWA} \\ \alpha_{CONS} \\ \alpha_{LIK} \\ \alpha_{CPRI} \\ \alpha_{CPRO} \\ \alpha_{CADV} \\ \alpha_{CDIS} \\ \alpha_{CAWA} \\ \alpha_{CCONS} \\ \alpha_{CLIK} \end{bmatrix} + \begin{bmatrix} \psi_{1S}t + \sum_{q=1}^3 \psi_{2S}^q QD_t \\ \psi_{1PRI}t + \sum_{q=1}^3 \psi_{2PRI}^q QD_t \\ \psi_{1PRO}t + \sum_{q=1}^3 \psi_{2PRO}^q QD_t \\ \psi_{1ADV}t + \sum_{q=1}^3 \psi_{2ADV}^q QD_t \\ \psi_{1DIS}t + \sum_{q=1}^3 \psi_{2DIS}^q QD_t \\ \psi_{1AWA}t + \sum_{q=1}^3 \psi_{2AWA}^q QD_t \\ \psi_{1CONS}t + \sum_{q=1}^3 \psi_{2CONS}^q QD_t \\ \psi_{1LIK}t + \sum_{q=1}^3 \psi_{2LIK}^q QD_t \\ \psi_{1CPRI}t + \sum_{q=1}^3 \psi_{2CPRI}^q QD_t \\ \psi_{1CPRO}t + \sum_{q=1}^3 \psi_{2CPRO}^q QD_t \\ \psi_{1CADV}t + \sum_{q=1}^3 \psi_{2CADV}^q QD_t \\ \psi_{1CDIS}t + \sum_{q=1}^3 \psi_{2CDIS}^q QD_t \\ \psi_{1CAWA}t + \sum_{q=1}^3 \psi_{2CAWA}^q QD_t \\ \psi_{1CCONS}t + \sum_{q=1}^3 \psi_{2CCONS}^q QD_t \\ \psi_{1CLIK}t + \sum_{q=1}^3 \psi_{2CLIK}^q QD_t \end{bmatrix} + \sum_{p=1}^P \begin{bmatrix} \phi_{1,1}^p & \dots & \phi_{1,15}^p \\ \phi_{2,1}^p & \dots & \phi_{2,15}^p \\ \phi_{3,1}^p & \dots & \phi_{3,15}^p \\ \phi_{4,1}^p & \dots & \phi_{4,15}^p \\ \phi_{5,1}^p & \dots & \phi_{5,15}^p \\ \phi_{6,1}^p & \dots & \phi_{6,15}^p \\ \phi_{7,1}^p & \dots & \phi_{7,15}^p \\ \phi_{8,1}^p & \dots & \phi_{8,15}^p \\ \phi_{9,1}^p & \dots & \phi_{9,15}^p \\ \phi_{10,1}^p & \dots & \phi_{10,15}^p \\ \phi_{11,1}^p & \dots & \phi_{11,15}^p \\ \phi_{12,1}^p & \dots & \phi_{12,15}^p \\ \phi_{13,1}^p & \dots & \phi_{13,15}^p \\ \phi_{14,1}^p & \dots & \phi_{14,15}^p \\ \phi_{15,1}^p & \dots & \phi_{15,15}^p \end{bmatrix} \begin{bmatrix} S_{t-p} \\ PRI_{t-p} \\ PRO_{t-p} \\ ADV_{t-p} \\ DIS_{t-p} \\ AWA_{t-p} \\ CONS_{t-p} \\ LIK_{t-p} \\ CPRI_{t-p} \\ CPRO_{t-p} \\ CADV_{t-p} \\ CDIS_{t-p} \\ CAWA_{t-p} \\ CCONS_{t-p} \\ CLIK_{t-p} \end{bmatrix} + \begin{bmatrix} \varepsilon_{S,t} \\ \varepsilon_{PRI,t} \\ \varepsilon_{PRO,t} \\ \varepsilon_{ADV,t} \\ \varepsilon_{DIS,t} \\ \varepsilon_{AWA,t} \\ \varepsilon_{CONS,t} \\ \varepsilon_{LIK,t} \\ \varepsilon_{CPRI,t} \\ \varepsilon_{CPRO,t} \\ \varepsilon_{CADV,t} \\ \varepsilon_{CDIS,t} \\ \varepsilon_{CAWA,t} \\ \varepsilon_{CCONS,t} \\ \varepsilon_{CLIK,t} \end{bmatrix}$$

where t is the deterministic-trend and the quarterly dummy variables are denoted by QD .

Σ is the covariance matrix of the residuals $[\varepsilon_{S,t} \ \varepsilon_{PRI,t} \ \varepsilon_{PRO,t} \ \varepsilon_{ADV,t} \ \varepsilon_{DIS,t} \ \varepsilon_{AWA,t} \ \varepsilon_{CONS,t} \ \varepsilon_{LIK,t} \ \varepsilon_{CPRI,t} \ \varepsilon_{CPRO,t} \ \varepsilon_{CADV,t} \ \varepsilon_{CDIS,t} \ \varepsilon_{CAWA,t} \ \varepsilon_{CCONS,t} \ \varepsilon_{CLIK,t}]'$. The dynamic interactions and feedback effects in Figure 1 are captured in the above VARX model (Dekimpe and Hanssens 2007). For instance, past sales gains (which imply more consumer experience with the brand in the market) influence current levels of consumer mindset metrics through coefficients $\phi_{6,1}^p - \phi_{8,1}^p$. Likewise, past sales may influence company advertising through coefficient $\phi_{4,1}^p$.

As benchmark models, we estimate (a) the 9-equation benchmark VARX model obtained by deleting the six mindset metric equations from the full VARX model and (b)

the 7-equation VARX model obtained by deleting the eight marketing-mix equations from the full VARX model. For the model (a), a 9-equation VARX model was estimated where the endogenous variables are sales, the four marketing mix variables - average retail price, advertising, distribution, promotion and the four corresponding competitive marketing-mix variables. In matrix notation the model given is by,

$$Y_{1t} = A_1 + \sum_{i=1}^p \phi_{1i} Y_{1t-i} + \psi_1 X_{1t} + \Sigma_{1t}, \quad t = 1, 2, \dots, T \quad (BM1)$$

where A_1 is a 9 x 1 vector of intercepts, Y_{1t} is an 9 x 1 vector of the endogenous variables listed above, and X_{1t} is a vector of exogenous control variables: (a) a deterministic-trend t to capture the impact of omitted, gradually-changing variables, and (b) quarterly dummy variables to account for seasonal fluctuations in sales or any other endogenous variable. Σ_{1t} is the covariance matrix of the residuals. A similar specification is used for the second benchmark model given by,

$$Y_{2t} = A_2 + \sum_{i=1}^p \phi_{2i} Y_{2t-i} + \psi_2 X_{2t} + \Sigma_{2t}, \quad t = 1, 2, \dots, T \quad (BM2)$$

where A_2 is a 7 x 1 vector of intercepts, Y_{2t} is the vector of 7 endogenous variables includes brand sales, the three mindset metrics variables, advertising awareness, consideration, liking and the three corresponding competitive mindset metrics variables. X_{2t} is a vector of exogenous control variables and Σ_{2t} is the covariance matrix of the residuals.

The number of parameters *per equation* for the benchmark model (BM1) with only marketing mix variables is 14 for number of lags (p)=1. This includes lagged endogenous variables (9), intercept (1), deterministic trend (1), and quarterly dummies (3). The number of parameters per equation for p=2, for example, is 23, including 9 additional parameters for the lags. For the model with mindset metrics only (BM2), the number of parameters per equation is 12 for p=1 and 19 for p=2. The corresponding numbers for the full model in equation (1) in the main text are 20 per equation for p=1. This includes lagged endogenous variables (15), intercept (1), deterministic trend (1), and quarterly dummies (3) and the corresponding number is 35 for p=2 (including 15

parameters for lags). The VARX models are estimated equation by equation (OLS is as efficient as SUR since the independent variables are identical across each equation). Therefore, a VARX model of order 1 (i.e. $p = 1$) estimates 20 parameters from 96 observations (a 4.8 observation-to-parameter ratio), while a model of order 2 estimates 35 parameters from 96 observations (a 2.7 ratio) etc. In the vast majority of cases, 1 lag was selected using the SBC criterion; the remaining models used 2 lags. As a result, the overall observation-to-parameter ratio is 4.2.

Finally, the VARX parameters from each of the models, the full model and the two benchmark models, are then used to derive GFEVD estimates (Pesaran and Shin 1998). To evaluate the accuracy of our GFEVD estimates, we obtain standard errors using Monte Carlo simulations (see Benkwitz et al. 2001).

Brand-specific results: explanatory power and sales elasticity estimates

Tables A1-A3 present the brand-specific results on the explanatory power of both benchmark models and the full model. Table A4 presents the brand specific results on the sales elasticities for the own marketing actions and mindset metrics.

Table A1: R^2 for the Benchmark Model with Only Marketing Actions

Brand	Distribution		Promotion		Price		Advertising		Volume
	O	C	O	C	O	C	O	C	Own
# 1	0.87	0.38	0.66	0.57	0.40	0.27	0.28	0.55	0.53
# 2	0.24	0.34	0.41	0.59	0.49	0.33	0.27	0.53	0.20
# 3	0.43	0.32	0.29	0.50	0.68	0.55	0.39	0.35	0.63
# 4	0.19	0.27	0.21	0.49	0.47	0.42	0.25	0.33	0.42
# 5	0.13	0.33	0.05	0.67	0.27	0.48	0.35	0.59	0.89
# 6	0.10	0.42	0.49	0.51	0.36	0.48	0.22	0.46	0.47
# 7	0.92	0.40	0.53	0.65	0.43	0.10	0.21	0.51	0.43
# 8	0.31	0.28	0.50	0.62	0.64	0.31	0.29	0.55	0.10
# 9	0.77	0.62	0.60	0.62	0.77	0.24	0.35	0.50	0.86
# 10	0.95	0.46	0.62	0.36	0.59	0.14	0.35	0.45	0.28
# 11	0.38	0.54	0.22	0.64	0.44	0.05	0.11	0.55	0.81
# 12	0.61	0.43	0.62	0.52	0.61	0.11	0.42	0.52	0.92
# 13	0.61	0.49	0.29	0.61	0.70	0.14	0.14	0.56	0.88
# 14	0.64	0.40	0.57	0.48	0.37	0.46	0.29	0.32	0.76
# 15	0.37	0.50	0.56	0.62	0.53	0.08	0.36	0.55	0.71
# 16	0.23	0.47	0.47	0.59	0.59	0.21	0.16	0.56	0.69
# 17	0.34	0.38	0.42	0.58	0.32	0.28	0.34	0.53	0.38
# 18	0.62	0.57	0.47	0.63	0.81	0.21	0.45	0.36	0.40
# 19	0.52	0.74	0.58	0.73	0.69	0.60	0.71	0.24	0.56
# 20	0.55	0.47	0.25	0.48	0.67	0.27	0.18	0.23	0.93
# 21	0.18	0.69	0.36	0.63	0.26	0.18	0.27	0.21	0.66
# 22	0.05	0.70	0.30	0.66	0.72	0.28	0.12	0.35	0.87
# 23	0.97	0.37	0.12	0.61	0.64	0.17	0.10	0.23	0.74
# 24	0.13	0.59	0.46	0.57	0.05	0.25	0.13	0.49	0.39
# 25	0.08	0.41	0.36	0.59	0.54	0.18	0.36	0.38	0.39
# 26	0.13	0.48	0.40	0.60	0.42	0.18	0.31	0.36	0.41
# 27	0.18	0.29	0.19	0.66	0.69	0.19	0.27	0.49	0.47
# 28	0.10	0.46	0.34	0.60	0.47	0.25	0.39	0.27	0.66
# 29	0.15	0.31	0.16	0.63	0.66	0.16	0.20	0.43	0.31
# 30	0.99	0.28	0.58	0.55	0.56	0.26	0.39	0.21	0.75
# 31	0.16	0.35	0.28	0.60	0.42	0.18	0.10	0.21	0.68
# 32	0.12	0.42	0.53	0.60	0.70	0.23	0.11	0.20	0.44
# 33	0.08	0.42	0.30	0.63	0.52	0.26	0.21	0.23	0.44
# 34	0.46	0.41	0.32	0.62	0.62	0.20	0.33	0.32	0.80
# 35	0.08	0.35	0.47	0.59	0.77	0.40	0.18	0.39	0.62
# 36	0.43	0.38	0.56	0.57	0.61	0.95	0.18	0.46	0.49
# 37	0.98	0.04	0.29	0.41	0.34	0.41	0.31	0.45	0.24
# 38	0.36	0.32	0.28	0.44	0.61	0.38	0.52	0.08	0.41
# 39	0.36	0.15	0.51	0.40	0.52	0.37	0.28	0.38	0.54
# 40	0.39	0.51	0.43	0.39	0.54	0.29	0.24	0.37	0.35
# 41	0.37	0.45	0.46	0.40	0.81	0.49	0.46	0.39	0.48
# 42	0.87	0.47	0.41	0.40	0.54	0.31	0.46	0.34	0.84
# 43	0.83	0.40	0.42	0.39	0.66	0.33	0.35	0.35	0.86
# 44	0.38	0.32	0.52	0.33	0.30	0.37	0.30	0.46	0.68
# 45	0.43	0.40	0.46	0.38	0.62	0.39	0.34	0.39	0.70
# 46	0.58	0.37	0.56	0.39	0.40	0.33	0.31	0.36	0.64
# 47	0.55	0.47	0.51	0.40	0.57	0.32	0.39	0.46	0.33
# 48	0.42	0.42	0.47	0.51	0.23	0.43	0.41	0.35	0.61
# 49	0.83	0.46	0.55	0.62	0.64	0.46	0.40	0.30	0.69
# 50	0.46	0.47	0.59	0.45	0.36	0.32	0.28	0.41	0.76
# 51	0.43	0.46	0.59	0.59	0.91	0.39	0.47	0.36	0.48
# 52	0.47	0.38	0.39	0.52	0.45	0.42	0.47	0.48	0.71
# 53	0.94	0.46	0.51	0.55	0.64	0.42	0.39	0.37	0.43
# 54	0.40	0.56	0.70	0.55	0.54	0.49	0.44	0.43	0.54
# 55	0.90	0.41	0.40	0.53	0.67	0.38	0.50	0.26	0.61
# 56	0.42	0.38	0.48	0.51	0.53	0.38	0.26	0.44	0.52
# 57	0.72	0.40	0.74	0.65	0.82	0.39	0.21	0.51	0.32
# 58	0.98	0.53	0.51	0.58	0.40	0.41	0.43	0.41	0.53
# 59	0.45	0.08	0.54	0.45	0.26	0.38	0.33	0.31	0.58
# 60	0.43	0.50	0.50	0.52	0.30	0.47	0.48	0.41	0.73
# 61	0.52	0.37	0.27	0.55	0.31	0.48	0.20	0.47	0.32
# 62	0.60	0.56	0.52	0.48	0.61	0.32	0.39	0.31	0.70
Average	0.43	0.41	0.47	0.57	0.54	0.32	0.31	0.39	0.57

O=own effects equation; C=competitive effects equation; Average for the system = Average of R^2 from last row = 0.45; and average R^2 for the sales equation in the full model = 0.57.

Table A2: R^2 for the Benchmark Model with Only Mindset Metrics

Brand	Awareness		Consideration		Liking		Volume
	O	C	O	C	O	C	Own
# 1	0.46	0.16	0.20	0.48	0.32	0.60	0.37
# 2	0.15	0.15	0.23	0.69	0.33	0.73	0.37
# 3	0.39	0.18	0.25	0.11	0.45	0.09	0.67
# 4	0.16	0.20	0.29	0.45	0.24	0.12	0.41
# 5	0.37	0.29	0.16	0.47	0.33	0.61	0.41
# 6	0.13	0.10	0.28	0.43	0.32	0.12	0.54
# 7	0.22	0.20	0.20	0.48	0.36	0.54	0.56
# 8	0.74	0.70	0.59	0.53	0.36	0.68	0.62
# 9	0.24	0.36	0.26	0.57	0.32	0.68	0.78
# 10	0.20	0.20	0.19	0.37	0.42	0.59	0.41
# 11	0.16	0.24	0.28	0.54	0.35	0.70	0.43
# 12	0.27	0.12	0.21	0.32	0.38	0.61	0.59
# 13	0.23	0.21	0.25	0.46	0.35	0.60	0.71
# 14	0.33	0.41	0.31	0.26	0.51	0.16	0.43
# 15	0.18	0.23	0.28	0.51	0.35	0.64	0.51
# 16	0.19	0.24	0.27	0.56	0.30	0.66	0.45
# 17	0.30	0.24	0.22	0.50	0.35	0.61	0.27
# 18	0.25	0.72	0.33	0.16	0.44	0.62	0.86
# 19	0.68	0.57	0.22	0.43	0.69	0.72	0.49
# 20	0.48	0.21	0.28	0.33	0.23	0.10	0.64
# 21	0.67	0.23	0.16	0.31	0.18	0.14	0.51
# 22	0.38	0.46	0.44	0.33	0.36	0.18	0.73
# 23	0.69	0.79	0.30	0.32	0.08	0.19	0.59
# 24	0.12	0.28	0.21	0.38	0.32	0.14	0.59
# 25	0.43	0.21	0.23	0.33	0.20	0.16	0.49
# 26	0.56	0.21	0.15	0.38	0.24	0.20	0.42
# 27	0.32	0.30	0.18	0.35	0.20	0.14	0.68
# 28	0.60	0.17	0.13	0.32	0.20	0.14	0.46
# 29	0.13	0.57	0.53	0.33	0.30	0.15	0.65
# 30	0.52	0.26	0.16	0.36	0.15	0.18	0.57
# 31	0.33	0.18	0.23	0.37	0.22	0.18	0.41
# 32	0.69	0.29	0.17	0.34	0.16	0.14	0.71
# 33	0.41	0.21	0.24	0.32	0.16	0.11	0.51
# 34	0.52	0.16	0.21	0.32	0.37	0.11	0.58
# 35	0.48	0.40	0.42	0.31	0.23	0.11	0.75
# 36	0.46	0.19	0.30	0.30	0.16	0.11	0.51
# 37	0.15	0.22	0.26	0.31	0.72	0.26	0.43
# 38	0.63	0.39	0.41	0.47	0.31	0.08	0.67
# 39	0.35	0.22	0.22	0.28	0.72	0.25	0.54
# 40	0.52	0.61	0.35	0.29	0.75	0.29	0.57
# 41	0.46	0.29	0.42	0.41	0.80	0.28	0.86
# 42	0.54	0.23	0.27	0.26	0.74	0.25	0.56
# 43	0.33	0.21	0.17	0.37	0.73	0.26	0.63
# 44	0.27	0.20	0.17	0.29	0.26	0.21	0.33
# 45	0.27	0.37	0.32	0.35	0.75	0.25	0.69
# 46	0.23	0.33	0.42	0.24	0.63	0.33	0.55
# 47	0.47	0.28	0.24	0.21	0.35	0.08	0.47
# 48	0.30	0.24	0.17	0.21	0.44	0.07	0.45
# 49	0.14	0.03	0.26	0.24	0.34	0.11	0.50
# 50	0.45	0.50	0.53	0.29	0.42	0.06	0.73
# 51	0.17	0.29	0.20	0.26	0.33	0.19	0.48
# 52	0.45	0.41	0.28	0.29	0.33	0.10	0.56
# 53	0.22	0.22	0.22	0.21	0.37	0.06	0.46
# 54	0.22	0.19	0.22	0.23	0.37	0.07	0.71
# 55	0.62	0.46	0.20	0.27	0.34	0.08	0.58
# 56	0.79	0.25	0.51	0.20	0.17	0.18	0.79
# 57	0.36	0.33	0.16	0.25	0.33	0.08	0.41
# 58	0.77	0.47	0.34	0.39	0.38	0.20	0.23
# 59	0.82	0.12	0.30	0.39	0.35	0.08	0.35
# 60	0.35	0.18	0.17	0.22	0.37	0.09	0.39
# 61	0.15	0.15	0.10	0.24	0.12	0.21	0.06
# 62	0.15	0.08	0.24	0.20	0.34	0.09	0.51
Average	0.38	0.29	0.27	0.34	0.37	0.27	0.54

O=own effects equation; C=competitive effects equation; Average for the system = Average of R^2 from last row= 0.35; and average R^2 for the sales equation in the full model =0.54.

Table A3: R^2 for the Full Model

Brand	Distribution		Price		Promotion		Advertising		Awareness		Consideration		Liking		Volume
	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
# 1	0.88	0.14	0.43	0.34	0.70	0.61	0.31	0.59	0.54	0.58	0.17	0.41	0.3	0.63	0.48
# 2	0.29	0.19	0.48	0.50	0.48	0.64	0.29	0.58	0.19	0.72	0.19	0.38	0.3	0.76	0.64
# 3	0.98	0.38	0.65	0.66	0.49	0.61	0.27	0.41	0.49	0.43	0.21	0.55	0.4	0.33	0.77
# 4	0.83	0.50	0.38	0.31	0.24	0.54	0.27	0.42	0.19	0.53	0.48	0.38	0.5	0.42	0.28
# 5	0.96	0.21	0.90	0.17	0.08	0.68	0.44	0.61	0.43	0.60	0.35	0.40	0.1	0.66	0.33
# 6	0.96	0.22	0.55	0.52	0.55	0.62	0.33	0.50	0.37	0.52	0.26	0.39	0.1	0.26	0.69
# 7	0.93	0.11	0.48	0.27	0.59	0.66	0.27	0.57	0.26	0.60	0.31	0.46	0.2	0.63	0.45
# 8	0.90	0.20	0.41	0.37	0.53	0.67	0.37	0.60	0.76	0.61	0.75	0.46	0.6	0.71	0.68
# 9	0.80	0.27	0.87	0.18	0.65	0.63	0.39	0.55	0.32	0.60	0.50	0.38	0.1	0.73	0.81
# 10	0.95	0.35	0.51	0.26	0.69	0.49	0.42	0.60	0.28	0.41	0.47	0.50	0.2	0.74	0.63
# 11	0.41	0.23	0.83	0.10	0.29	0.67	0.57	0.61	0.31	0.61	0.21	0.41	0.1	0.75	0.49
# 12	0.67	0.32	0.94	0.36	0.66	0.54	0.49	0.59	0.33	0.49	0.20	0.51	0.1	0.72	0.63
# 13	0.66	0.14	0.89	0.29	0.34	0.62	0.47	0.60	0.28	0.54	0.21	0.47	0.2	0.68	0.73
# 14	0.73	0.43	0.78	0.67	0.70	0.64	0.37	0.39	0.59	0.42	0.59	0.61	0.4	0.29	0.53
# 15	0.40	0.19	0.72	0.16	0.58	0.64	0.38	0.61	0.29	0.60	0.32	0.41	0.3	0.68	0.88
# 16	0.26	0.24	0.73	0.32	0.52	0.63	0.43	0.64	0.24	0.61	0.15	0.36	0.3	0.74	0.62
# 17	0.42	0.16	0.14	0.41	0.46	0.63	0.39	0.60	0.36	0.58	0.19	0.40	0.2	0.65	0.55
# 18	0.65	0.25	0.24	0.23	0.51	0.66	0.49	0.39	0.32	0.20	0.74	0.50	0.3	0.65	0.86
# 19	0.33	0.38	0.86	0.20	0.33	0.66	0.56	0.58	0.71	0.52	0.60	0.73	0.2	0.74	0.69
# 20	0.59	0.23	0.94	0.53	0.32	0.56	0.46	0.35	0.66	0.42	0.29	0.32	0.3	0.47	0.70
# 21	0.23	0.57	0.45	0.50	0.48	0.67	0.42	0.30	0.74	0.45	0.49	0.25	0.4	0.22	0.68
# 22	0.16	0.13	0.88	0.39	0.37	0.70	0.42	0.41	0.46	0.50	0.54	0.39	0.5	0.34	0.75
# 23	0.97	0.36	0.59	0.19	0.25	0.66	0.49	0.30	0.74	0.41	0.82	0.12	0.1	0.30	0.66
# 24	0.94	0.60	0.38	0.21	0.55	0.60	0.57	0.27	0.55	0.68	0.52	0.52	0.3	0.57	0.75
# 25	0.13	0.41	0.50	0.20	0.41	0.63	0.40	0.36	0.49	0.42	0.46	0.41	0.4	0.44	0.58
# 26	0.97	0.47	0.23	0.28	0.44	0.65	0.50	0.32	0.61	0.43	0.52	0.30	0.4	0.32	0.49
# 27	0.25	0.18	0.22	0.41	0.21	0.68	0.30	0.59	0.38	0.42	0.46	0.23	0.3	0.42	0.71
# 28	0.94	0.17	0.70	0.90	0.46	0.64	0.30	0.36	0.69	0.42	0.52	0.28	0.4	0.43	0.52
# 29	0.98	0.47	0.41	0.79	0.27	0.68	0.43	0.37	0.50	0.45	0.72	0.34	0.5	0.23	0.73
# 30	1.00	0.41	0.77	0.30	0.62	0.62	0.47	0.54	0.63	0.54	0.51	0.29	0.2	0.38	0.60
# 31	0.97	0.46	0.33	0.38	0.35	0.67	0.57	0.58	0.48	0.47	0.49	0.28	0.3	0.32	0.68
# 32	0.96	0.48	0.53	0.27	0.55	0.63	0.40	0.28	0.72	0.42	0.41	0.24	0.2	0.42	0.75
# 33	0.88	0.48	0.55	0.21	0.42	0.67	0.43	0.36	0.56	0.43	0.23	0.77	0.2	0.42	0.61
# 34	0.90	0.52	0.82	0.25	0.34	0.66	0.36	0.37	0.56	0.43	0.26	0.43	0.1	0.46	0.65
# 35	0.11	0.49	0.65	0.42	0.49	0.64	0.23	0.34	0.52	0.43	0.50	0.30	0.4	0.26	0.79
# 36	0.15	0.43	0.24	0.96	0.63	0.59	0.31	0.20	0.54	0.39	0.30	0.53	0.3	0.38	0.64
# 37	0.98	0.59	0.25	0.34	0.36	0.44	0.43	0.48	0.17	0.44	0.26	0.76	0.2	0.39	0.82
# 38	0.99	0.57	0.39	0.39	0.38	0.54	0.41	0.58	0.77	0.57	0.57	0.42	0.6	0.48	0.71
# 39	0.92	0.47	0.40	0.45	0.56	0.50	0.39	0.47	0.42	0.32	0.34	0.77	0.4	0.45	0.60
# 40	0.99	0.45	0.44	0.31	0.52	0.45	0.27	0.47	0.65	0.48	0.70	0.80	0.5	0.42	0.63
# 41	0.85	0.49	0.57	0.36	0.36	0.46	0.35	0.39	0.54	0.45	0.28	0.81	0.4	0.42	0.86
# 42	0.89	0.47	0.85	0.36	0.44	0.45	0.52	0.39	0.61	0.39	0.35	0.80	0.4	0.40	0.60
# 43	0.85	0.58	0.87	0.35	0.44	0.43	0.41	0.45	0.42	0.43	0.13	0.75	0.5	0.44	0.68
# 44	0.80	0.44	0.68	0.45	0.58	0.56	0.43	0.33	0.29	0.39	0.55	0.60	0.5	0.47	0.66
# 45	0.90	0.43	0.74	0.39	0.43	0.46	0.52	0.39	0.41	0.39	0.43	0.77	0.4	0.38	0.73
# 46	1.00	0.41	0.67	0.34	0.63	0.44	0.41	0.39	0.35	0.41	0.42	0.76	0.6	0.43	0.78
# 47	0.97	0.63	0.44	0.41	0.44	0.46	0.33	0.48	0.43	0.39	0.47	0.76	0.5	0.47	0.68
# 48	0.42	0.49	0.34	0.46	0.33	0.53	0.58	0.33	0.52	0.27	0.15	0.47	0.1	0.46	0.65
# 49	0.87	0.48	0.74	0.28	0.40	0.64	0.54	0.47	0.45	0.25	0.45	0.56	0.3	0.48	0.69
# 50	0.16	0.79	0.15	0.62	0.50	0.24	0.22	0.36	0.34	0.15	0.39	0.58	0.4	0.41	0.71
# 51	0.99	0.40	0.55	0.49	0.80	0.61	0.50	0.42	0.55	0.37	0.57	0.52	0.5	0.30	0.77
# 52	0.50	0.42	0.84	0.16	0.31	0.53	0.41	0.56	0.19	0.37	0.44	0.43	0.2	0.22	0.51
# 53	0.95	0.57	0.37	0.49	0.52	0.58	0.38	0.31	0.52	0.34	0.51	0.43	0.3	0.20	0.67
# 54	0.93	0.48	0.42	0.32	0.26	0.57	0.45	0.38	0.27	0.26	0.28	0.42	0.6	0.11	0.66

Brand	Distribution		Price		Promotion		Advertising		Awareness		Consideration		Liking		Volume
	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
# 55	0.95	0.68	0.18	0.19	0.50	0.56	0.41	0.38	0.29	0.32	0.25	0.46	0.4	0.17	0.72
# 56	0.99	0.48	0.49	0.08	0.49	0.55	0.40	0.37	0.69	0.39	0.55	0.52	0.4	0.69	0.75
# 57	0.99	0.42	0.47	0.28	0.78	0.71	0.23	0.31	0.82	0.24	0.35	0.59	0.5	0.30	0.86
# 58	0.98	0.39	0.55	0.12	0.53	0.61	0.47	0.45	0.47	0.39	0.41	0.41	0.5	0.48	0.69
# 59	0.94	0.37	0.65	0.25	0.61	0.44	0.33	0.34	0.80	0.42	0.59	0.51	0.4	0.29	0.70
# 60	0.84	0.50	0.76	0.38	0.56	0.53	0.13	0.26	0.83	0.43	0.22	0.43	0.4	0.33	0.70
# 61	0.96	0.41	0.50	0.45	0.36	0.57	0.29	0.51	0.48	0.30	0.41	0.43	0.4	0.48	0.75
# 62	0.83	0.46	0.72	0.48	0.53	0.50	0.39	0.34	0.18	0.23	0.13	0.38	0.3	0.47	0.80
Average	0.75	0.40	0.56	0.37	0.47	0.58	0.40	0.44	0.48	0.44	0.40	0.48	0.3	0.46	0.67

1. O=own effects equation; C=competitive effects equation
2. Average for the system = Average of R-squared of the last row= 0.49
3. Average for the sales equation in the full model =0.67 from last row

Table A4. Elasticities of Sales to Marketing Mix and Mindset Metrics

Brand	Price	Promotions	Advertising	Distribution	Ad Awareness	Consideration	Liking
# 1	-0.47	0.46	0.07	1.12	0.53	0.96	0.01 (ns)
# 2	-0.48	0.12	(-0.01) (ns)	3.83 (ns)	0.12 (ns)	0.82	-0.62 (ns)
# 3	-2.93	0.40	0.08	3.11 (ns)	0.17	-0.42 (ns)	0.1 (ns)
# 4	-0.59	0.09	0.03	2.55	0.13 (ns)	-0.25 (ns)	-0.98 (ns)
# 5	-2.99	0.04 (ns)	-0.01 (ns)	2.44	0.02 (ns)	1.28	0.76
# 6	-3.30	0.01 (ns)	0.03 (ns)	2.36 (ns)	0.09 (ns)	0.04 (ns)	-0.34 (ns)
# 7	-0.61	0.12	0.0	2.56 (ns)	0.13 (ns)	-0.30 (ns)	0 (ns)
# 8	-0.40 (ns)	0.10	0.02 (ns)	0.92	0.14 (ns)	0.07	0.18
# 9	-0.22 (ns)	0.11	0.01 (ns)	1.11	0.24	1.19	1.24
# 10	-0.12 (ns)	0.39	0.05	2.35	0.03 (ns)	1.42	-0.18 (ns)
# 11	-5.55	0.26	0.06	2.22 (ns)	0.33	-0.35 (ns)	0.08 (ns)
# 12	-2.79	0.32	0.00 (ns)	1.22 (ns)	-0.01 (ns)	0.92	1.45
# 13	-4.25	0.10 (ns)	0.12	2.47	0.74	0.05 (ns)	0.58
# 14	-2.68	0.18	0.09	2.55	0.14	-0.52 (ns)	1.19
# 15	-3.97	0.26	0.06	2.66 (ns)	0.08 (ns)	-0.21 (ns)	0.4
# 16	-0.34 (ns)	0.02 (ns)	-0.02 (ns)	2.56	0.12	1.35	0.81
# 17	-0.59	0.39	0.05	3.08 (ns)	0.10 (ns)	0.03 (ns)	-1.41 (ns)
# 18	-0.56	0.08 (ns)	0.03 (ns)	1.34	0.12 (ns)	0.46	0.82
# 19	-2.93	0.10	0.09	1.21	0.13	0.05 (ns)	-0.29 (ns)
# 20	-2.76	0.03 (ns)	0.02	2.45 (ns)	0.15	0.08 (ns)	1.16
# 21	-0.31 (ns)	0.05	0.04	2.36	0.47	0.89	1.66
# 22	-2.94	0.16	0.06	1.45 (ns)	0.06 (ns)	1.61	2.81
# 23	-0.01	0.22	0.06	2.59	0.70	1.48	0 (ns)
# 24	-0.33 (ns)	0.01	-0.01 (ns)	2.85	0.12	0.02	0.16
# 25	-2.94	0.01 (ns)	0.06	2.59 (ns)	0.67	1.14	0.66
# 26	-0.24 (ns)	0.03	0.05	2.87	0.00 (ns)	0.05	0.03 (ns)
# 27	-0.57	0.25	0.05	2.75 (ns)	0.70	1.57	0.71
# 28	-0.66	0.39	0.00 (ns)	2.72	0.14	1.86	-0.01 (ns)
# 29	0.00	0.08	0.02	2.79	-0.02 (ns)	1.77 (ns)	0.54
# 30	-2.83	0.59	0.08	0.96 (ns)	0.64	0.09	0.01 (ns)
# 31	-0.44 (ns)	0.95	0.03 (ns)	2.97	0.04 (ns)	0 (ns)	0 (ns)
# 32	-3.19	0.62	0.06	3.88 (ns)	1.07	-0.64 (ns)	0.71
# 33	-3.00	0.05	-0.00 (ns)	0.11	0.13 (ns)	-0.44 (ns)	0.01 (ns)
# 34	-0.62	0.07	0.12	3.24 (ns)	0.60	0.78	0.56
# 35	-2.58	-0.03	0.08	2.83	0.40	0.63	5.12 (ns)
# 36	-0.21 (ns)	0.90	0.03 (ns)	0.37 (ns)	0.53	0.05 (ns)	2.62
# 37	-0.17 (ns)	0.09	0.03	2.69 (ns)	0.13	0.01 (ns)	0.01 (ns)
# 38	0.00	-0.01	0.00 (ns)	2.90	1.38	0.81	0.8
# 39	-2.76	0.04 (ns)	0.02 (ns)	3.22 (ns)	0.14 (ns)	-0.33 (ns)	0.79
# 40	-0.33 (ns)	0.10 (ns)	0.03	2.99	0.49	0.84	2.4
# 41	-2.73	0.78	0.04	0.64 (ns)	0.65	0.87	7.71 (ns)
# 42	-2.87	0.19	0.04	2.81	0.44	-0.46 (ns)	0.06 (ns)
# 43	-2.87	0.91	0.06	2.83	0.47	0.02 (ns)	-0.01 (ns)
# 44	-2.94	0.07	-0.01 (ns)	2.76	0.15	0.02	0.5
# 45	-0.12 (ns)	0.29	0.06	2.78 (ns)	0.88	0.82	0.77
# 46	-0.50	0.00	0.00 (ns)	2.81 (ns)	0.05 (ns)	0.73	-8.2 (ns)
# 47	-0.38 (ns)	0.00	0.01 (ns)	2.87	0.14	0.88	1.31
# 48	-3.50	0.22	0.08	2.78	0.22	-0.69 (ns)	0.45
# 49	-3.65	0.14	0.05	2.67 (ns)	0.09 (ns)	0	0.01 (ns)
# 50	-3.77	0.09	0.03 (ns)	2.96	0.02 (ns)	0.64	1.12
# 51	-2.89	0.06 (ns)	-0.01 (ns)	2.81	0.52	0.58	1.1
# 52	-3.43	0.09 (ns)	0.04	2.03 (ns)	0.04 (ns)	0.42	1.11
# 53	-0.24 (ns)	0.72	0.03	0.23	0.22	0.59	1.89

# 54	-0.27 (ns)	0.10 (ns)	0.03 (ns)	2.81	-0.01 (ns)	-0.51 (ns)	-0.01 (ns)
# 55	-0.60	0.08 (ns)	0.00 (ns)	2.73 (ns)	0.09 (ns)	0.09 (ns)	0.02 (ns)
# 56	0.01	0.47	0.04	2.80	0.14 (ns)	1.33	1.28
# 57	-3.73	0.37	0.00 (ns)	2.97	0.49	-0.45 (ns)	1.02
# 58	-2.84	1.48	0.00 (ns)	2.84	0.07 (ns)	0.14	0.76
# 59	-3.97	0.83	0.05	3.44 (ns)	0.47	0 (ns)	-0.01 (ns)
# 60	-0.62	0.89	0.04	2.81	0.30	-0.50 (ns)	0.31 (ns)
# 61	-2.92	0.66	0.05	2.84	0.44	-0.31 (ns)	0.845
# 62	0.01	0.61	0.01 (ns)	2.85 (ns)	0.09 (ns)	0.10	0 (ns)
Median*	-0.642	0.120	0.037	2.740	0.149	0.093	0.519
Average*	-1.734	0.277	0.036	2.424	0.289	0.374	0.590
Median**	-2.830	0.220	0.050	2.783	0.454	0.820	0.815
Average**	-2.208	0.335	0.057	2.381	0.444	0.782	1.034

*Calculated including significant and insignificant estimates.

**Calculated including only the significant estimates.