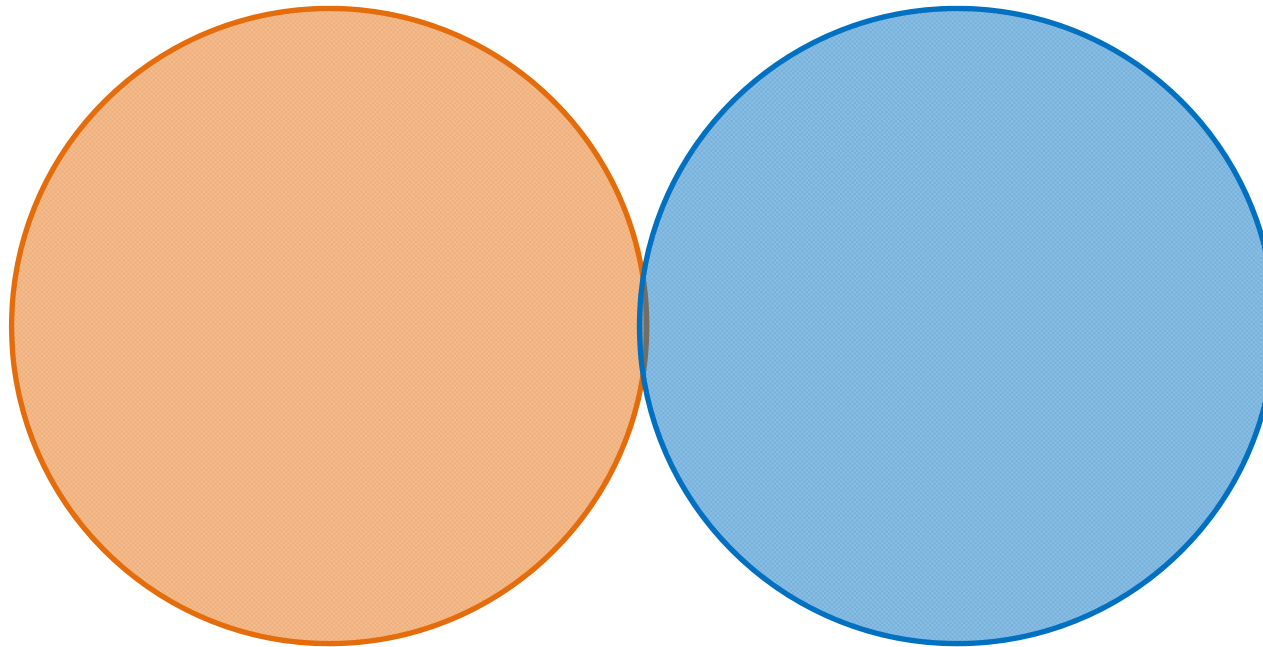


Market Mix Modelling in R



Why aren't more market mix modellers using R?

Steve Cookson | May 2016

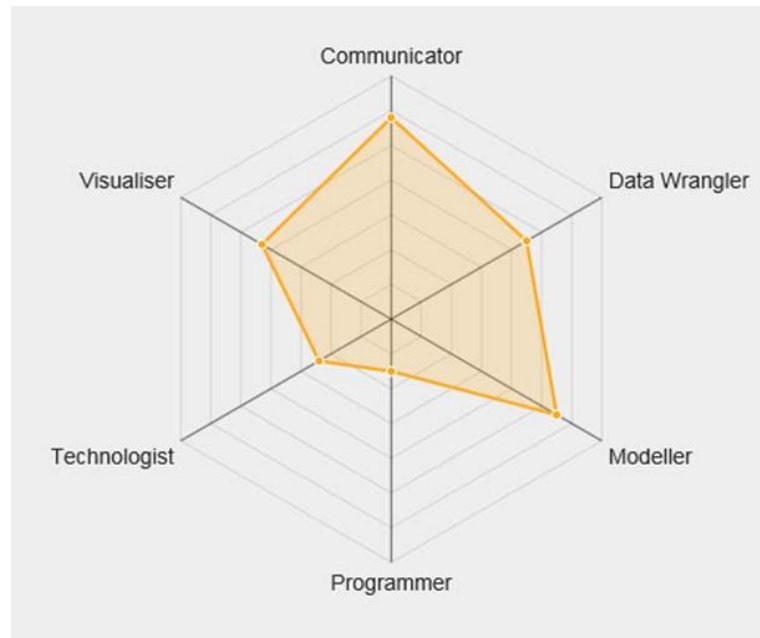
Market Mix Modelling in R

- My Background
- Market Mix Modelling (MMM)
 - What it is
 - Process & Output
- Why R is underused in MMM
- 3 challenges to MMM that R can help with

My Background

- Started Market Mix Modelling in 2005

- Currently *Kellogg's*  dentsu AEGIS network



My Mango Data Science Radar

What is Market Mix Modelling?

Market Mix Modelling (MMM)

Branch of
Econometrics

Economics
+ Statistics

**Data-driven technique
to measure the impact
of marketing**



Stakeholder Questions

Gather Data

Market Mix Modelling (MMM)

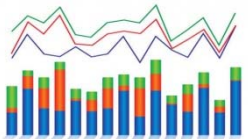
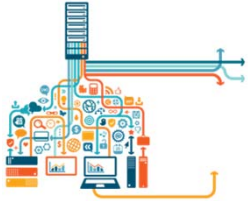
Branch of
Econometrics

Quantify drivers of a KPI
– e.g. sales

Economics
+ Statistics

Plug in financial data to
calculate ROI

Budget Allocation



Example Stakeholder Questions

- Was my new product launch additive to the business or did it cannibalise?
- How does the stocking issue in Q2 affect our year-end forecast?
- I have an additional \$1MM budget. Should I invest in Germany or Spain?
- Should I advertise Brand A or Brand B?
- Should I increase my % spend behind digital media?
- Should I stick with my new TV ad, or revert back to the old one?
- How did the cold weather affect our summer holiday campaign?
- Can I increase price or should I reduce?

What data do you think we need for an MMM project?

- Can include (but not limited to):

- KPI : usually sales
- Media and/or marketing
- Competitors
- Climate
- Holidays
- Macro trends – e.g. economy
- Stocking measures / shocks
- Price and promotions



- Characteristics:

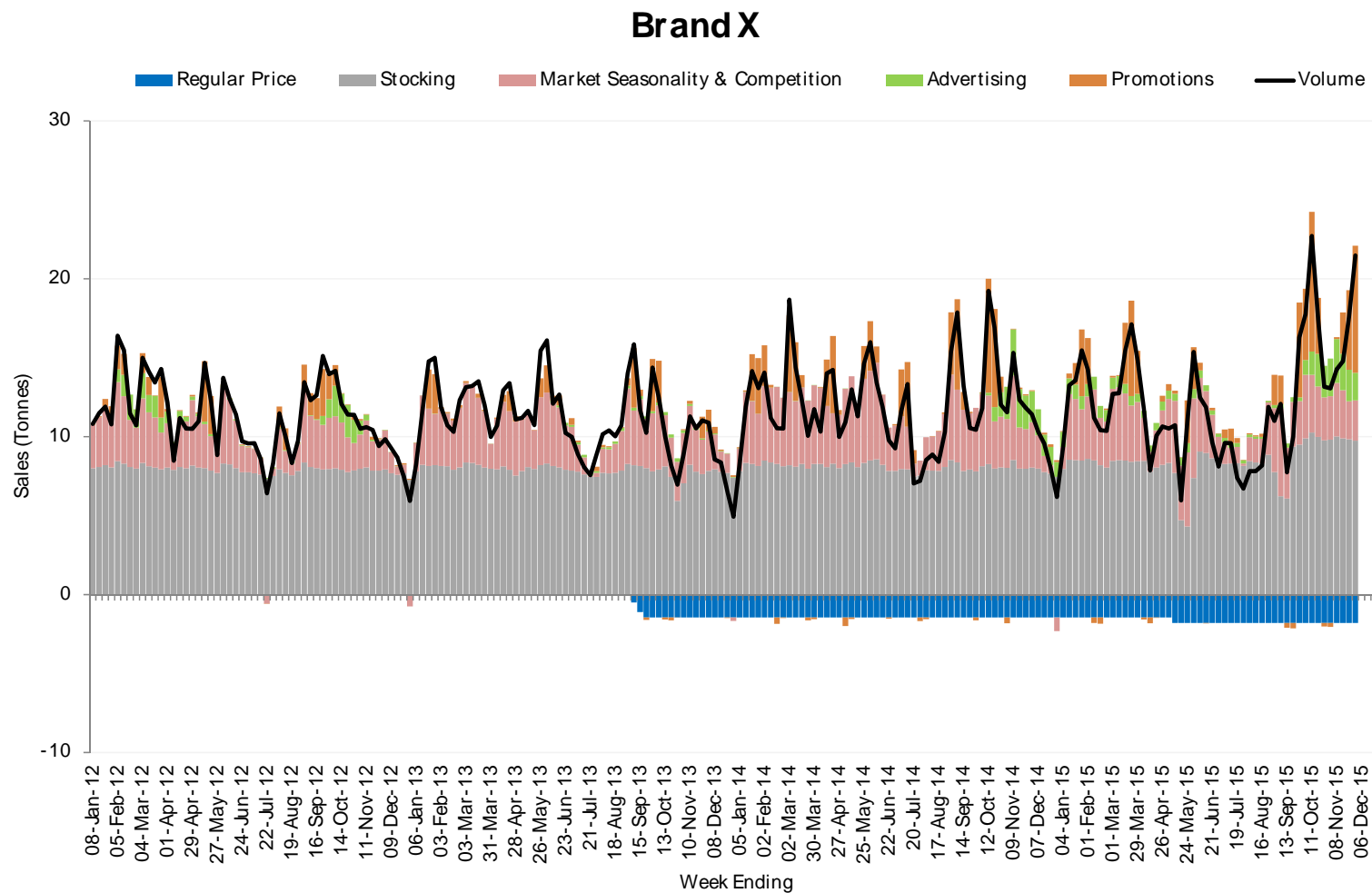
- Over Time : Weekly, (Monthly, Daily or even Hourly)
- Regional (where possible)

MMM Methodology

- Majority: Time Series, Multivariate Ordinary Least Square (OLS) Regression
 - Explaining why a KPI like sales changes over time
 - Correlate multiple factors at once
 - Minimise the difference between the actual KPI and the modelled KPI
 - Look for **stable** models that make **sense**
- For equation fans: $y_t = \alpha + \beta_1 x_{1t} + \beta_2 x_{2t} + \dots + \beta_i x_{it} + \varepsilon_t$

MMM Output

- Modellers tend not to show the equation details to clients
- Instead, we present the model graphically



MMM Applications

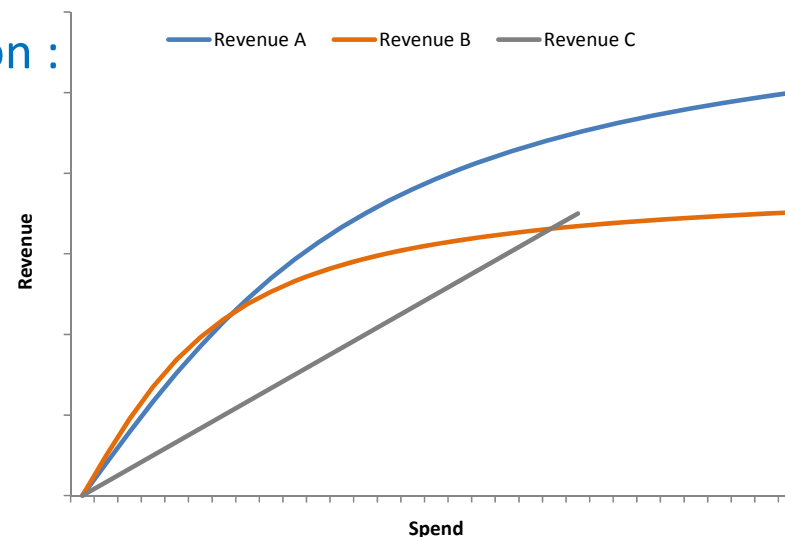
- Price Elasticity :

- For every % increase in price, by what % will my sales fall ?
 - Rule of thumb: if the price elasticity < 1, then raising prices will increase profits

- Return on Investment (ROI) :

- For every £1 I spent, how much did I get back in sales (or profit) ?
- Example calculation:
 - From a market mix model, we know that advertising generated 5,000 units of sales, worth £100,000
 - We also know that we spent £300,000 on advertising
 - So the ROI = $\text{£}100,000 / \text{£}300,000 = 0.33$

- Budget allocation :



MMM alternatives to R

- Most market mix modellers don't use R

- Either:



- Or MMM-specific software:



- Or create their own software in-house

Why not R ?

- Possible reasons?
 - Economics graduates using E-Views and STATA ?
 - Licensing issues ?
- Key issue: speed
 - Many MMM data sets are still small enough to manipulate in Excel
 - Click and point is faster than command-driven model building
 - CommandR package is basic
 - Churn out standard MMM-specific charts

Can R help with challenges to MMM?

- **Challenge #1- Explain the MMM results**

- Simply reporting ROI is not enough
- We must explain why ROI has changed
- One way involves storing models and their results
- Run (cross-sectional) meta-analysis of modelling results
- R can store modelled results as variables / values for later use
- R is better suited to cross-sectional modelling than existing MMM software



Can R help with challenges to MMM?

- Challenge #2- Forecasting and optimising



- Static reporting is not enough
- Clients are looking for scenario planning tools as standard
- R (via Shiny) can provide a direct link between models and an interactive output

Can R help with challenges to MMM?

- Challenge #3- Alternative techniques



- MMM already exists in parallel to Digital Attribution and Single-Source modelling
- These methodologies could merge in the future
- Both use larger data sets than MMM and more complicated statistical techniques than Ordinary Least Squares (OLS)
- R can handle larger data sets / automated links
- R is more versatile than existing MMM software – goes beyond OLS

Thank You

Questions?