

Biennial Convention 2007

# Adventures in Risk

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Institute of Actuaries of Australia



## **An Actuarial Approach to Optimising the Trade-off Between Media and Price Promotions**

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Stevenson**



## Agenda

- The challenge
- Traditional solutions
- Media modelling – an actuarial approach
- Media optimisation
- Incorporating price and value
- Conclusions



## Increased call for accountability

- Need to justify large marketing budgets
- Need to integrate expenditure in 4Ps
- Particular problems arise where price and promotional planning is not integrated



## Importance of considering price

- Personal loans example
  - Wide range of the quality of risks
- Marketing interested in generating more applications, regardless of quality
- Pricing interested in profitability of converted risks
- Overall business outcome?



## One answer: Source code analysis

- Many advertisers reliant on traditional measures
- Unique phone numbers, names or reference codes
- These measures can offer some insights into what is working
  - But take little account of the multi-media, cumulative effects of exposure



## Another answer? - Basic econometrics

- Helps identify what factors influence results
- Determines the broad return on spend equation

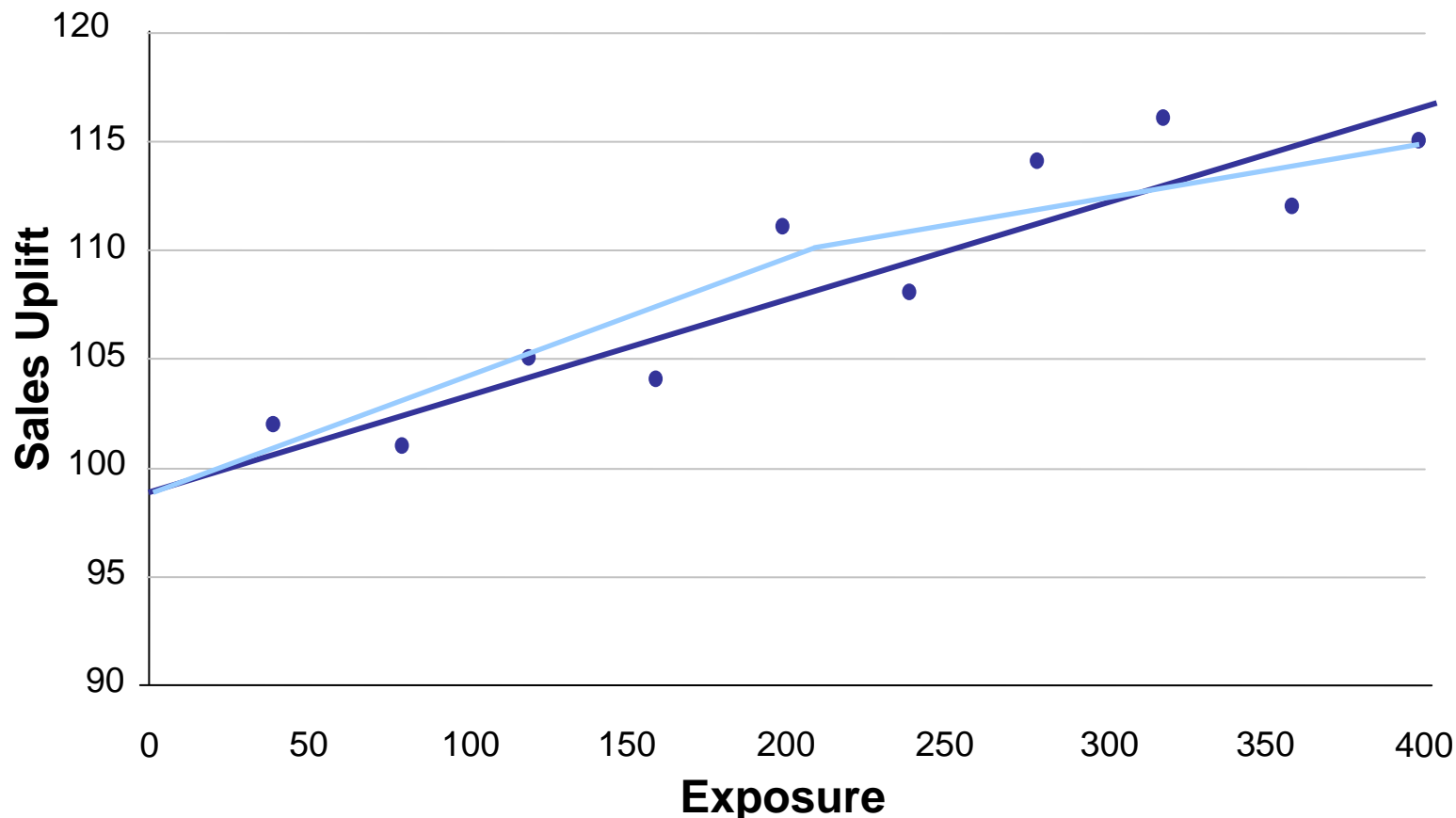


## But...

- Small number of factors considered
- Rarely sufficiently 'granular' to identify regional differences and price effects
- Almost always fails to accurately identify isolated channel effects
- Usually does not sufficiently take into account exposure, rather than spend



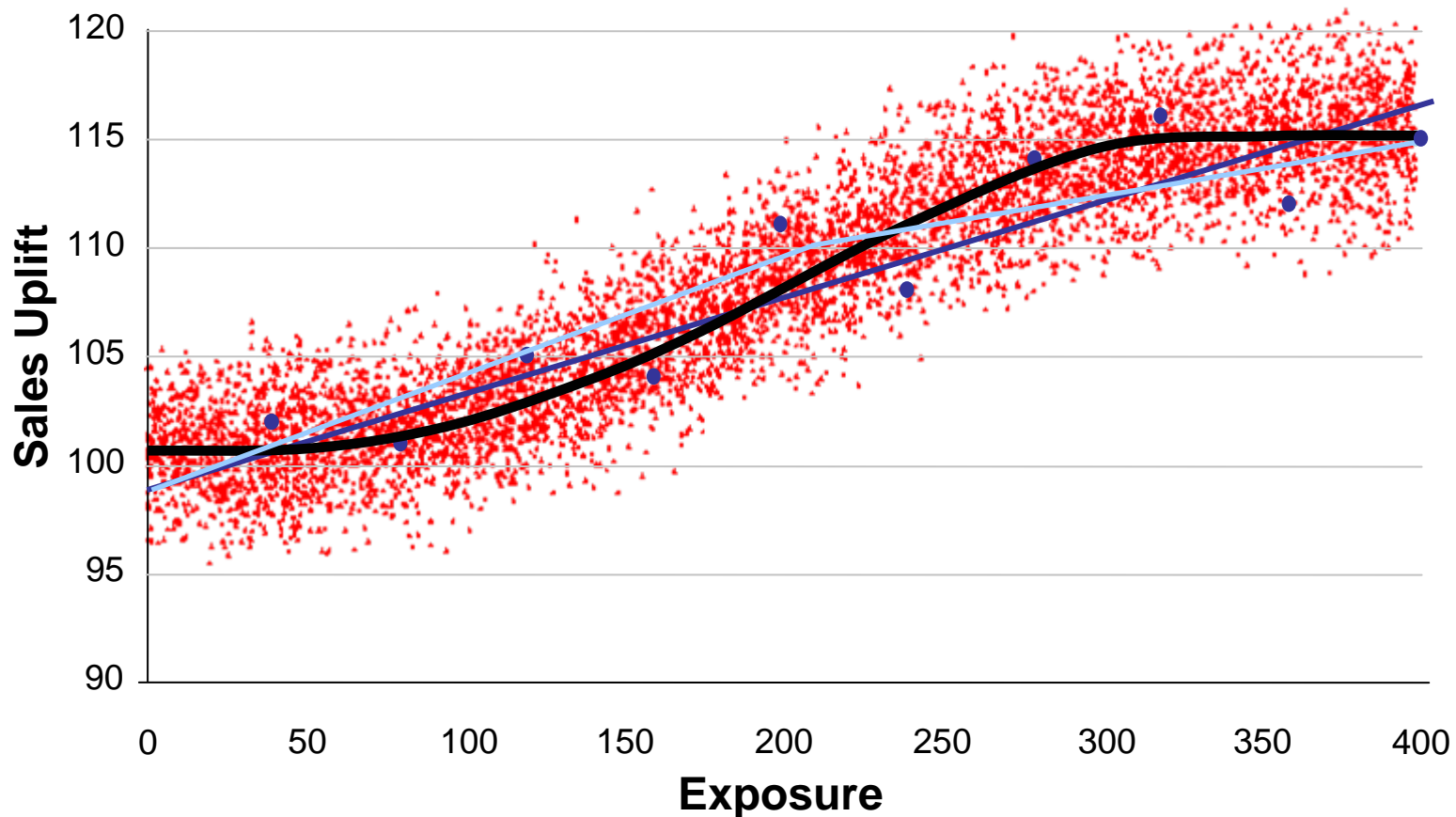
## Econometric models often built on very limited amounts of data...





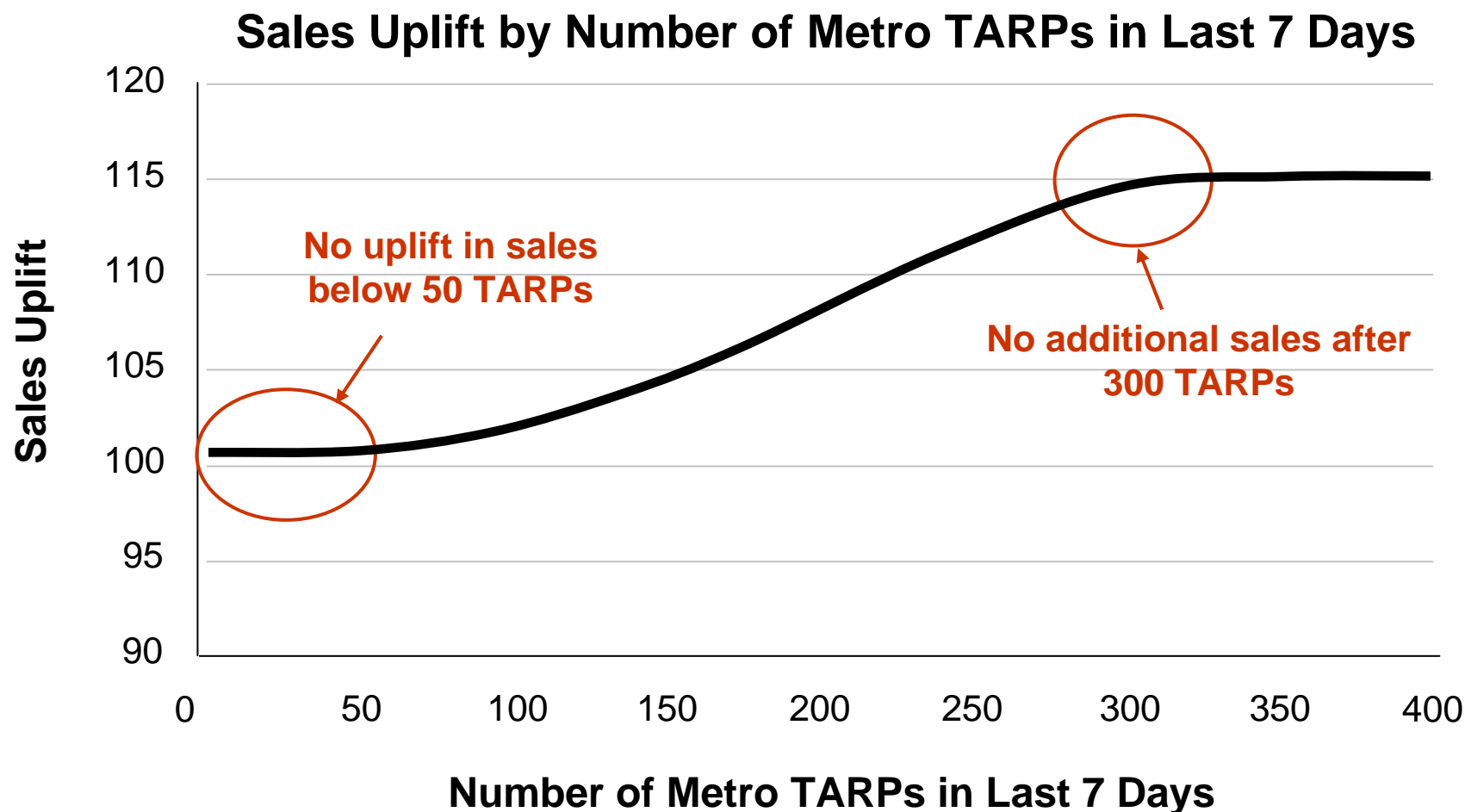


**...but what if we had more  
historical data?**





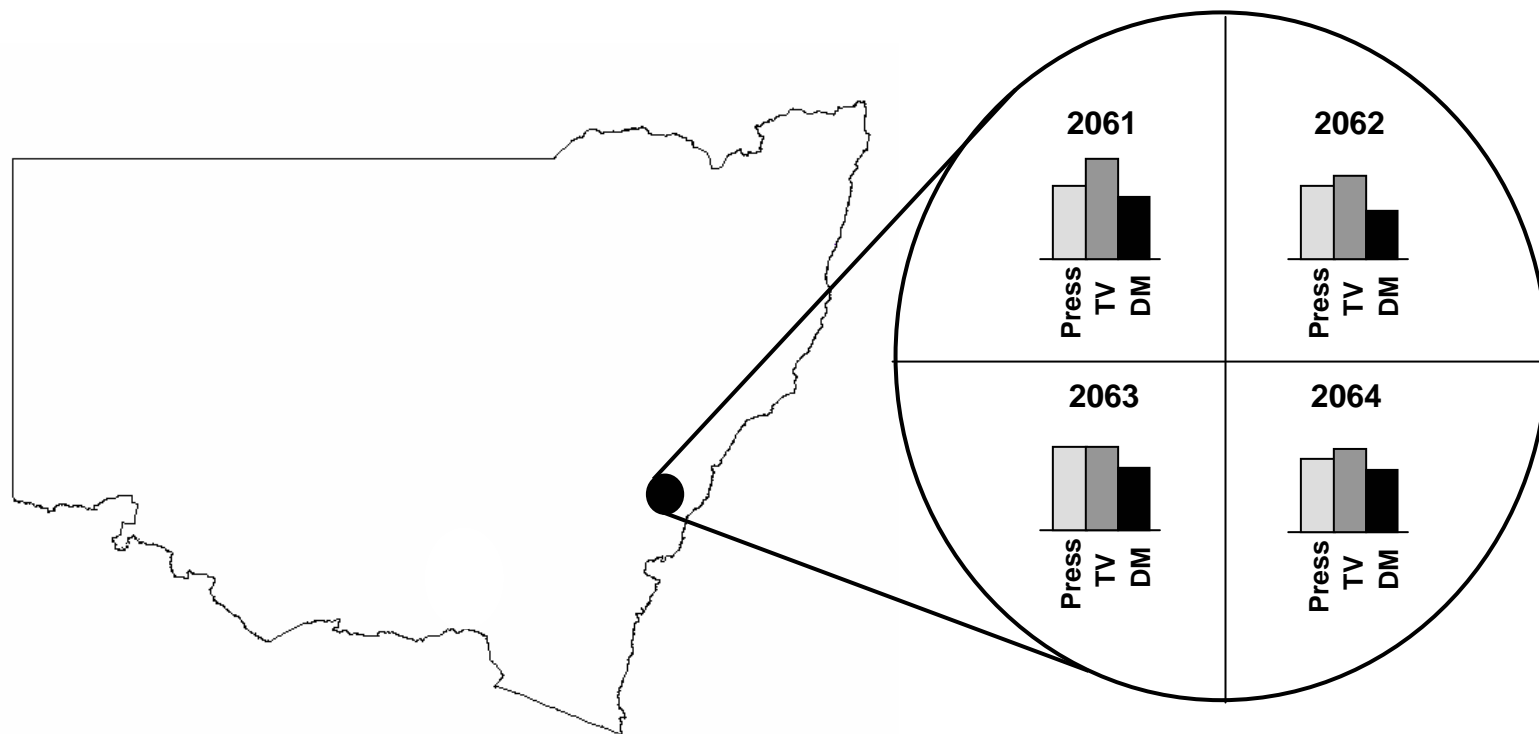
## We isolate the “pure effect” of each variable on sales...





## We generate this data by modelling at a micro level...

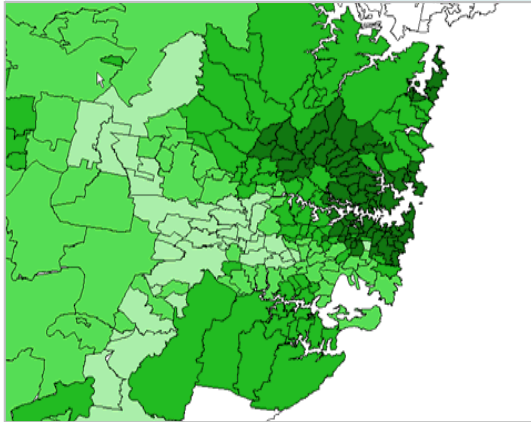
- Postcode, CCD or Household level



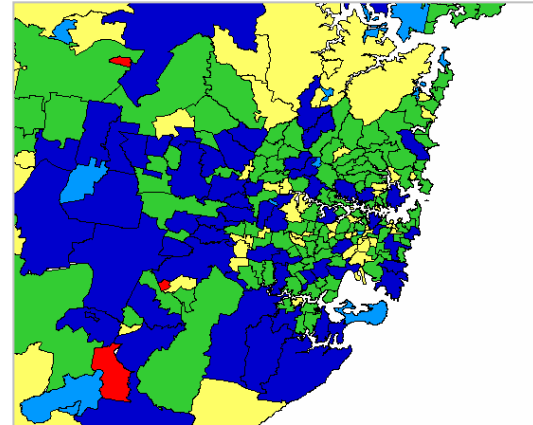


## ...utilising different media footprints..

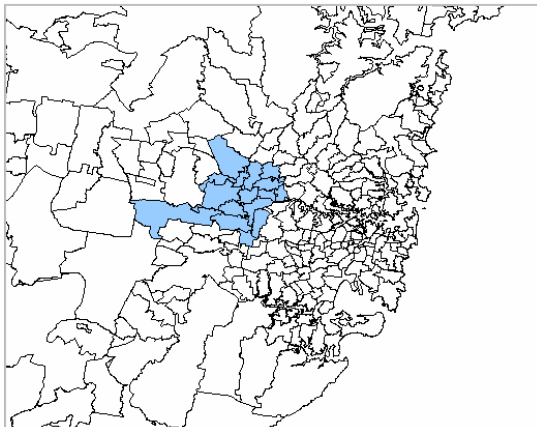
**Metro TV**



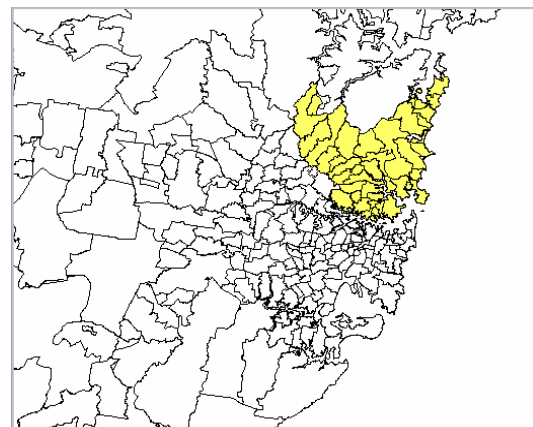
**Metro Press**  
– Sydney Morning Herald



**Community Newspapers**  
– Parramatta Advertiser



**Cross-Sales DM Campaign**





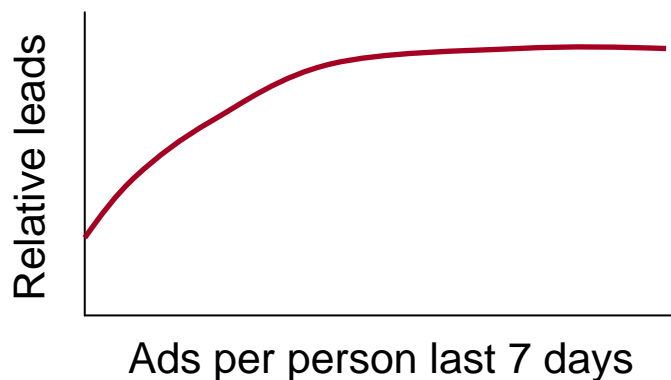
## **..and controlling for various other regional variations..**

- Existing product penetration (e.g. Bank)
- Branch footprint (e.g. Bank)
- Serviceability (e.g. Telco)
- Socio-demographics

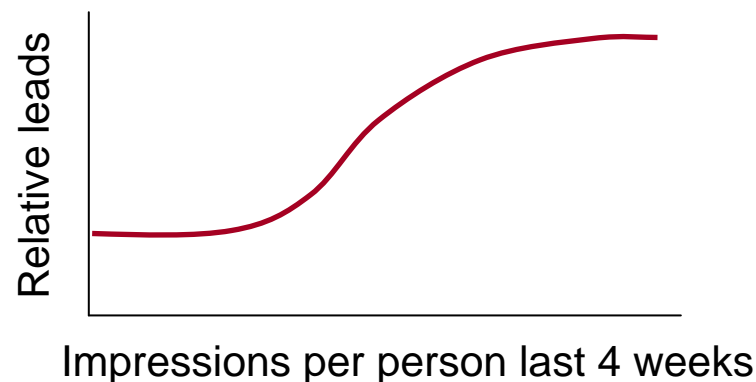


## ...to determine each pure effect

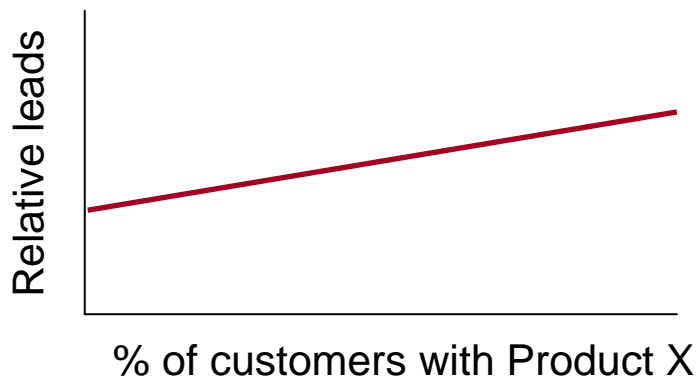
### Radio



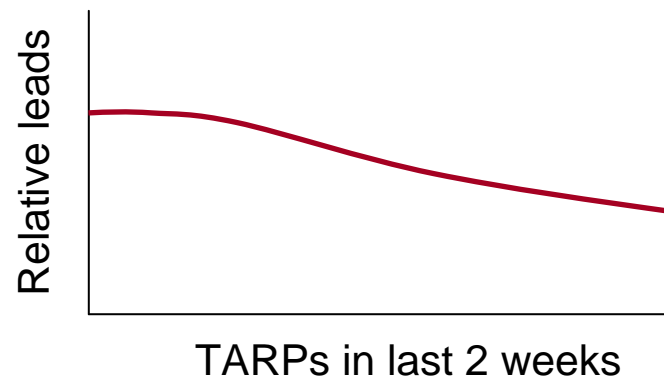
### National Press



### Product X Penetration



### Competitor TV







## Modelling delivers valuable insights...

- Isolates the individual channel impact
- Uncovers the range of exposure levels that will drive response
- Quantifies the lift in response achievable by each channel
- These rules can immediately be incorporated into the planning process



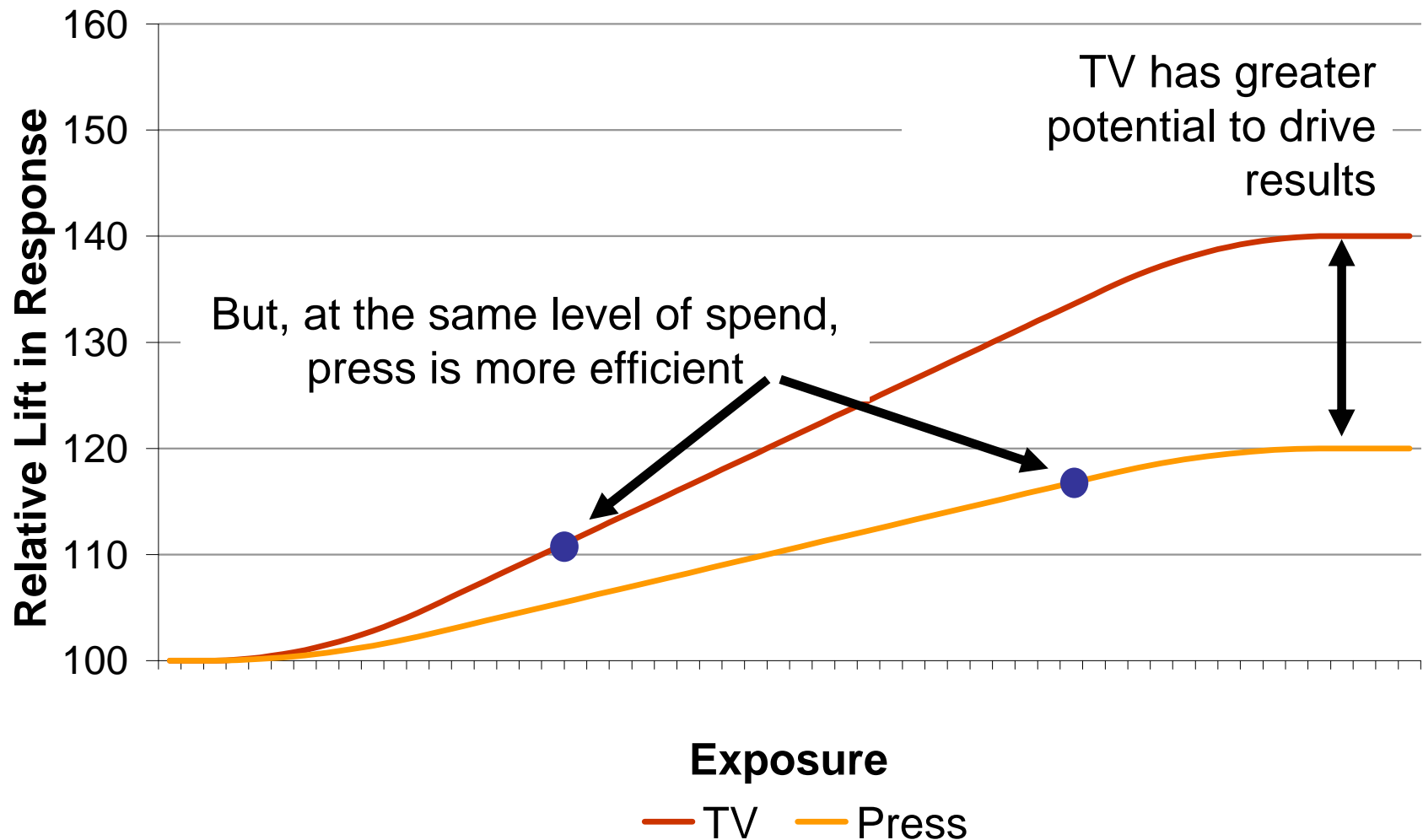
## ...but needs to contribute to dynamic planning processes

- The true trade-off is between media options
  - Is my specific budget better spent on TV and press or TV and radio?
  - How expensive can press become before we start to replace it with radio?



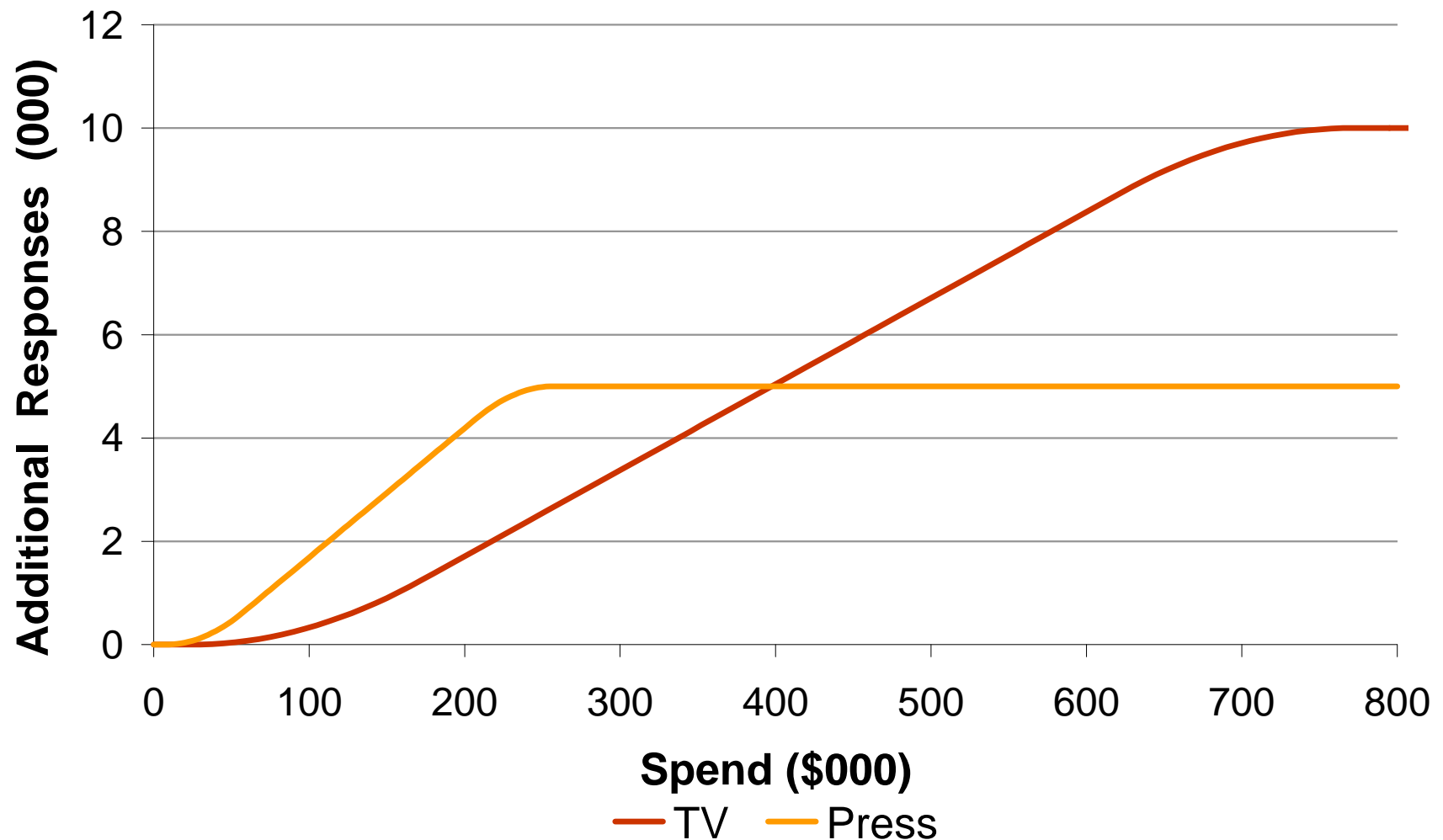


## Efficiency versus effectiveness





## Turning exposure into spend





## Scenario testing and optimisation

Import Proposed  
Media Schedules &  
Other Parameters



Media Planning  
System



Optimal Media  
Scenario

**Schedule A**

Line Item	Start Date	End Date	Start Time	End Time	Day of Week	Spots	Cost
1.000000	1/1/07	31/12/07	18:00	19:00	MON-FRI	10	\$100,000
2.000000	1/1/07	31/12/07	19:00	20:00	SAT-SUN	5	\$50,000
3.000000	1/1/07	31/12/07	20:00	21:00	MON-FRI	10	\$100,000
4.000000	1/1/07	31/12/07	21:00	22:00	SAT-SUN	5	\$50,000
5.000000	1/1/07	31/12/07	22:00	23:00	MON-FRI	10	\$100,000
6.000000	1/1/07	31/12/07	23:00	00:00	SAT-SUN	5	\$50,000
7.000000	1/1/07	31/12/07	00:00	01:00	MON-FRI	10	\$100,000
8.000000	1/1/07	31/12/07	01:00	02:00	SAT-SUN	5	\$50,000
9.000000	1/1/07	31/12/07	02:00	03:00	MON-FRI	10	\$100,000
10.000000	1/1/07	31/12/07	03:00	04:00	SAT-SUN	5	\$50,000



Create, edit  
and refine  
schedules

Interrogate  
results

Predict  
sales



**Schedule**

Line Item	Start Date	End Date	Start Time	End Time	Day of Week	Spots	Cost
1.000000	1/1/07	31/12/07	18:00	19:00	MON-FRI	10	\$100,000
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10.000000	1/1/07	31/12/07	03:00	04:00	SAT-SUN	5	\$50,000



# High level proposed scenario

**Scenario Summary**

Name:  View

Start Date:  To:  Total Spend:  Schedule Type:  Media Category:  ☒ Week ☐ Month

**Cost Based Categories**

☐ Expanded ☐ Include History

	04-Feb	11-Feb	18-Feb	25-Feb	04-Mar	11-Mar	18-Mar	25-Mar
<input type="button" value="Edit"/> Home TV	\$55	\$55	\$55	\$55	\$55	\$55	\$55	\$55
<input type="button" value="Edit"/> Home Press	-	-	-	-	-	-	-	-
<input type="button" value="Edit"/> Home Radio	-	-	-	-	-	-	-	-
<input type="button" value="Edit"/> Motor TV	-	-	-	-	-	-	-	-
<input type="button" value="Edit"/> Motor Press	-	-	\$29	\$11	\$51	\$34	\$25	\$39
<input type="button" value="Edit"/> Motor Radio	-	-	-	-	-	-	-	-
<input type="button" value="Edit"/> Brand TV	\$28	\$32	\$29	\$13	\$7	\$63	\$111	\$33
<input type="button" value="Edit"/> Brand Press	\$43	\$9	\$1	\$36	\$8	\$1	\$20	-
<input type="button" value="Edit"/> Brand Radio	\$24	\$19	\$26	\$21	\$25	\$20	\$25	\$21
<input type="button" value="Edit"/> Sponser TV	-	-	-	-	-	-	-	-
<input type="button" value="Edit"/> Sponser Press	\$3	-	\$1	\$4	-	-	-	-
<input type="button" value="Edit"/> Sponser Radio	-	-	-	-	-	-	-	-
<b>Total Spend (\$000)</b>	\$153	\$115	\$141	\$139	\$147	\$172	\$235	\$149

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# Metropolitan press schedule

**Edit Press - Metro Schedule**

Manage Newspapers

Sort By  
☒ Newspaper
☐ State
☐ Distribution

Filter By Newspaper
Show All

☐ Show Historic Weeks  
☒ Weekly Cost Pers

Group	Newspaper - Ads	Avg Cost Per	04-Feb	11-Feb	18-Feb	25-Feb	04-Mar	11-Mar	18-Mar	25-Mar
	Advertiser [Mon-Fri]	\$3,538 <a href="#">Set All &gt;&gt;</a>				1.0		1.0		1.0
						\$3,538		\$3,538		\$3,538
	Courier Mail [Mon-Fri]	\$5,521 <a href="#">Set All &gt;&gt;</a>			1.0		1.0			1.0
					\$5,592		\$5,971			\$5,000
	Daily Telegraph [Mon-Fri]	\$12,338 <a href="#">Set All &gt;&gt;</a>			1.0				1.0	
					\$12,113				\$12,562	
	Herald Sun [Mon-Fri]	\$14,772 <a href="#">Set All &gt;&gt;</a>					1.0	1.0		
							\$14,772	\$14,772		
	Mercury [Mon-Fri]	\$1,205 <a href="#">Set All &gt;&gt;</a>			1.0			1.0		
					\$1,284			\$1,126		
	Sydney Morning Herald [Mon-Fri]	\$14,160 <a href="#">Set All &gt;&gt;</a>					1.0			1.0
							\$13,671			\$14,648
	The Age [Mon-Fri]	\$9,554 <a href="#">Set All &gt;&gt;</a>					1.0			1.0
							\$9,554			\$9,554
	West Australian [Mon-Fri]	\$4,992 <a href="#">Set All &gt;&gt;</a>				1.0	1.0	1.0		1.0
						\$4,517	\$5,511	\$5,351		\$4,589

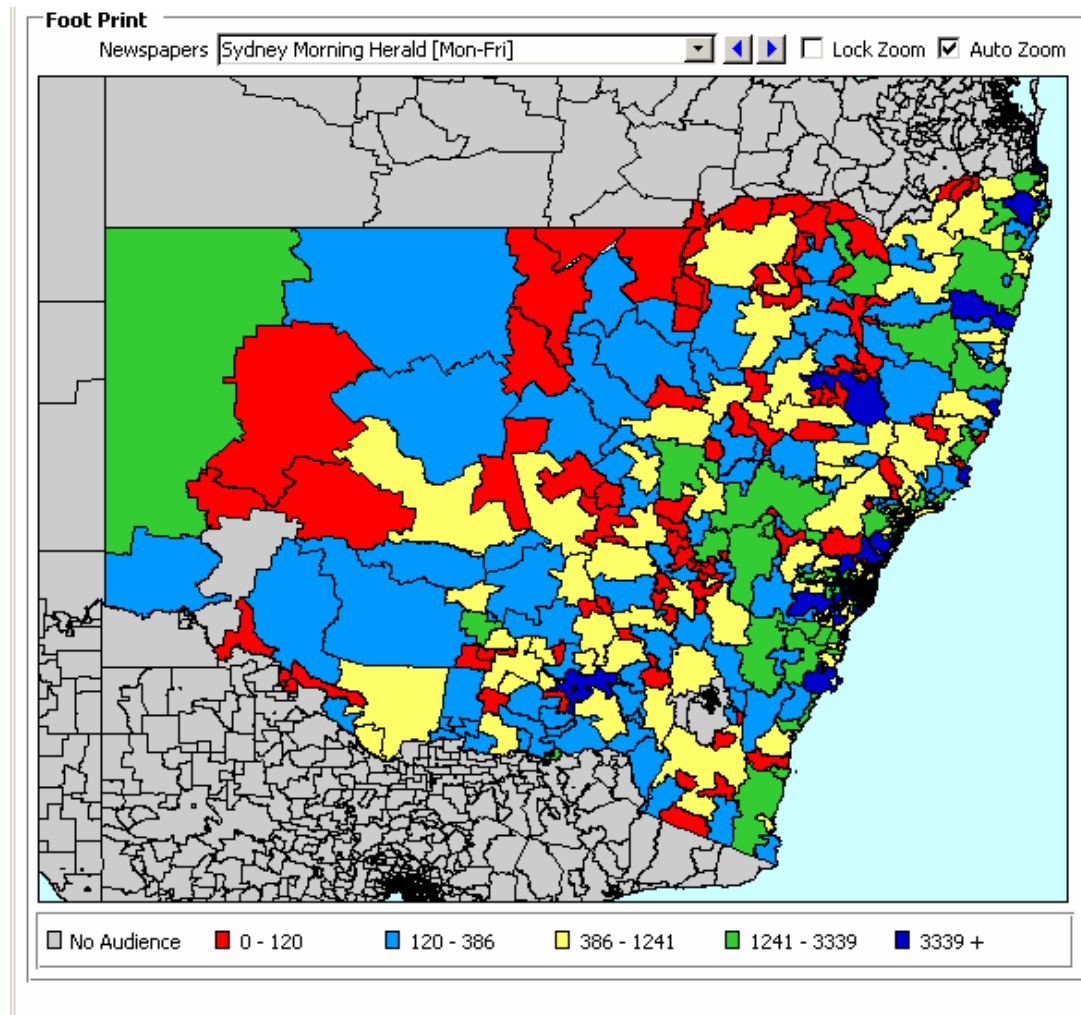
Press - Metro Spend
\$151,201
Refresh

Add Newspaper
Clear Selected
Populate From Scenario

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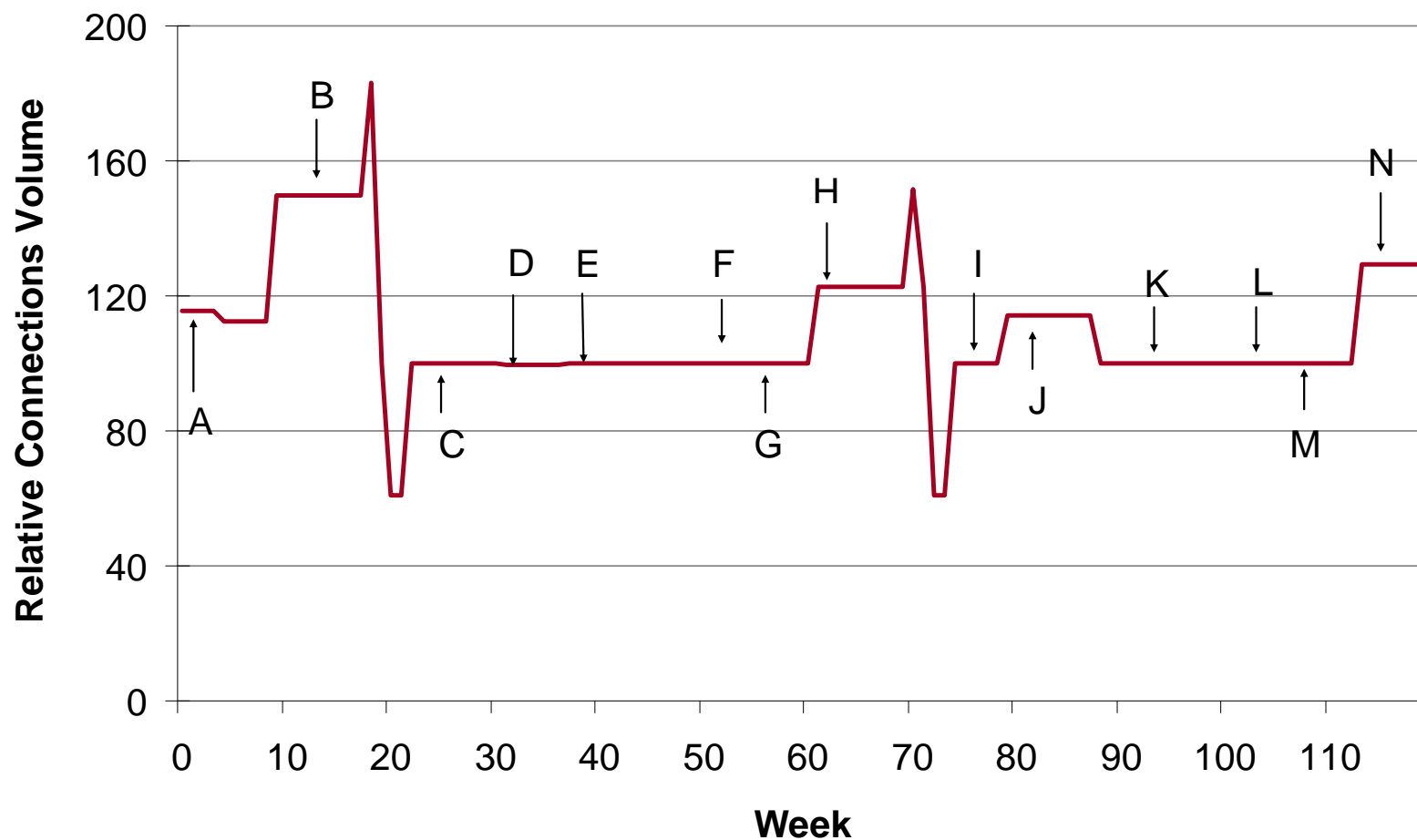


## Each with their own footprint..





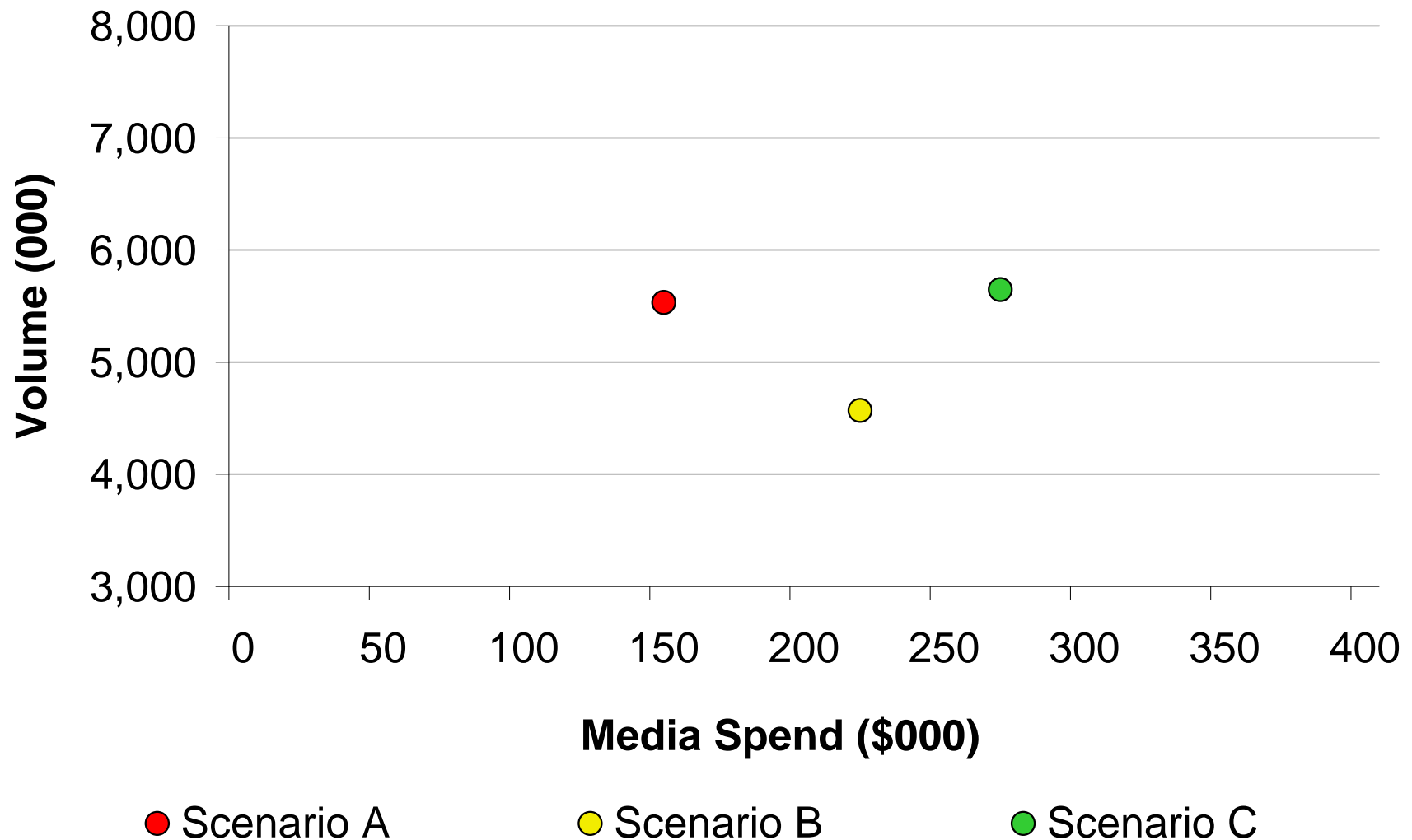
## Also need to specify price/offer







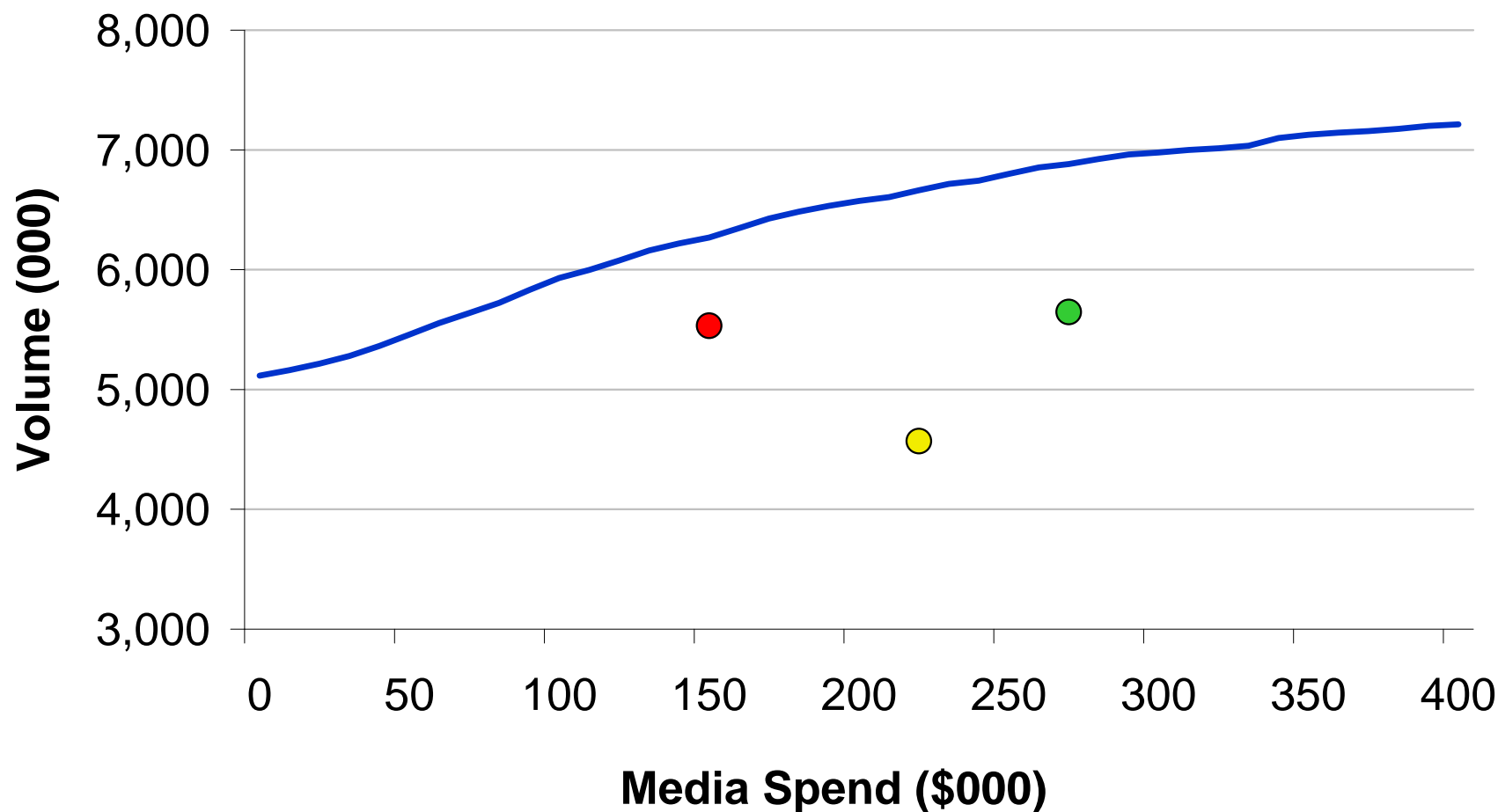
## Compare alternative scenarios







## Optimising media spend



— Efficient Frontier    ● Scenario A    ● Scenario B    ● Scenario C



## Practicality and reality

- In practice it may not be possible to purchase the optimal schedule for a variety of reasons
  - Availability of media
  - Commitments already in place

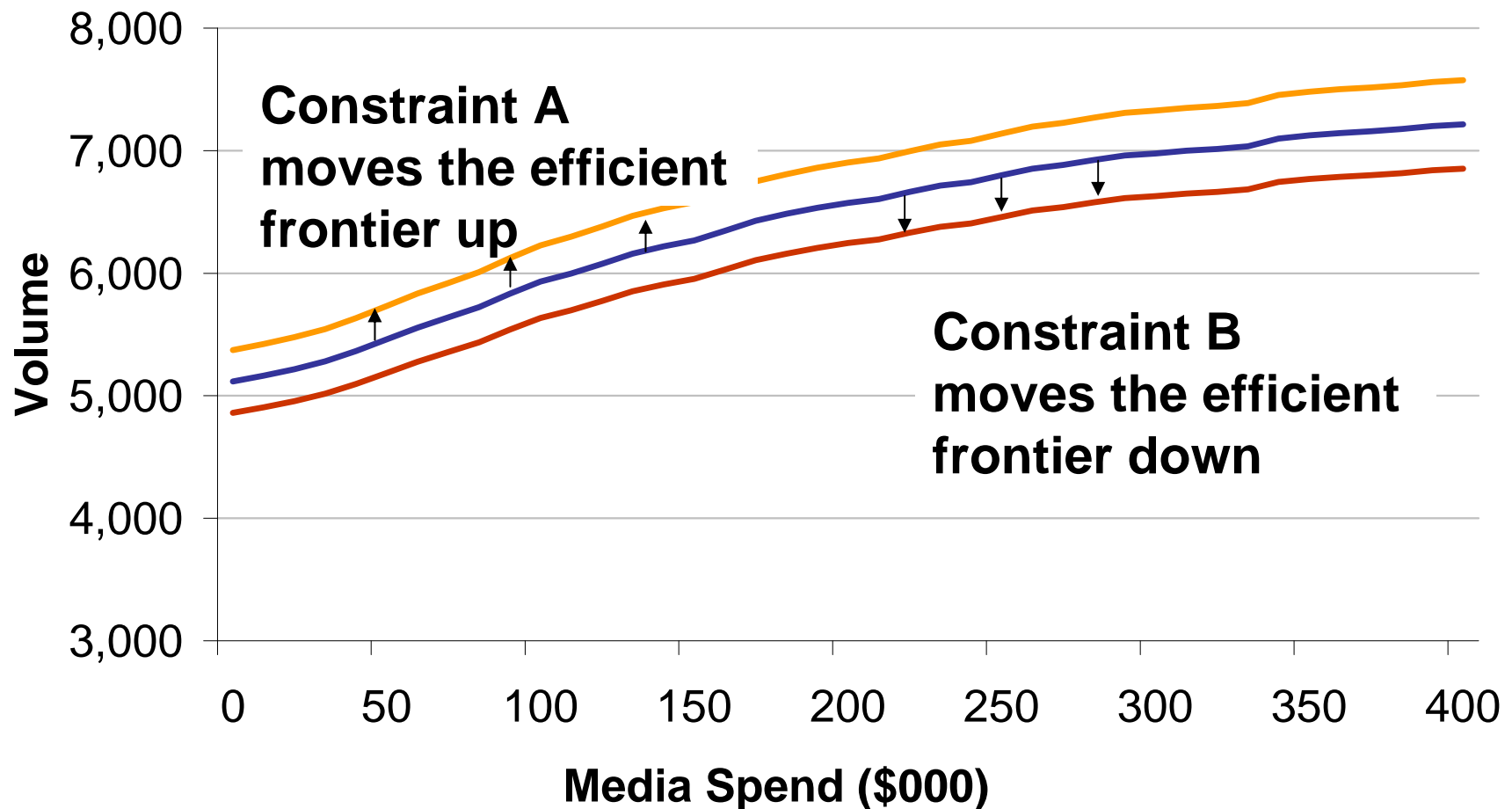


## Practicality and reality

- Thus, as many real-life business constraints as possible should be built into the process
  - Fix or cap spend for a specific channel or market
  - Exclude certain channels



## Constraints will shift the frontier



— Efficient Frontier — Constrained Frontier A — Constrained Frontier B



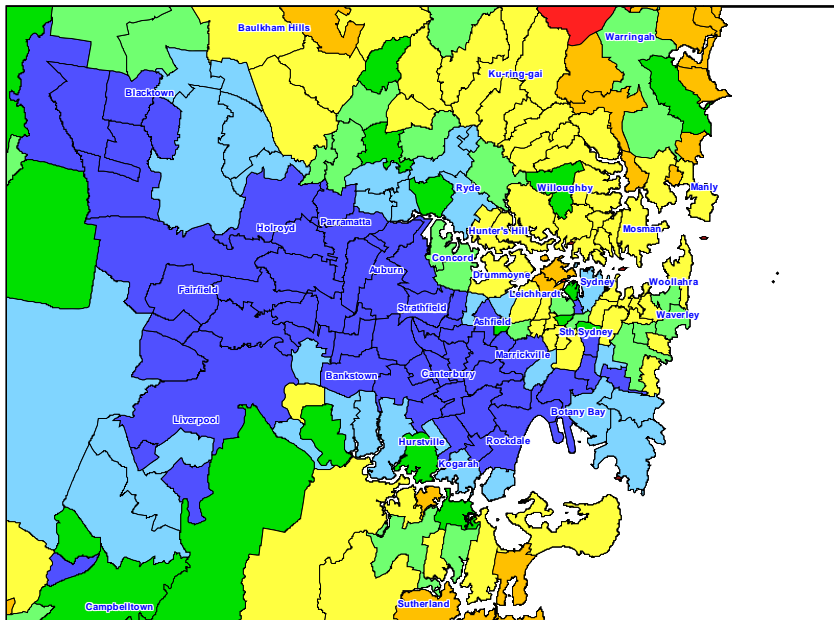
## Optimising value versus response

- Is the number of responses the right metric to be optimising?
- Including value allows more specific targeting of media
- This can vastly alter the optimal media mix, especially if conversion rates and value differ greatly by region

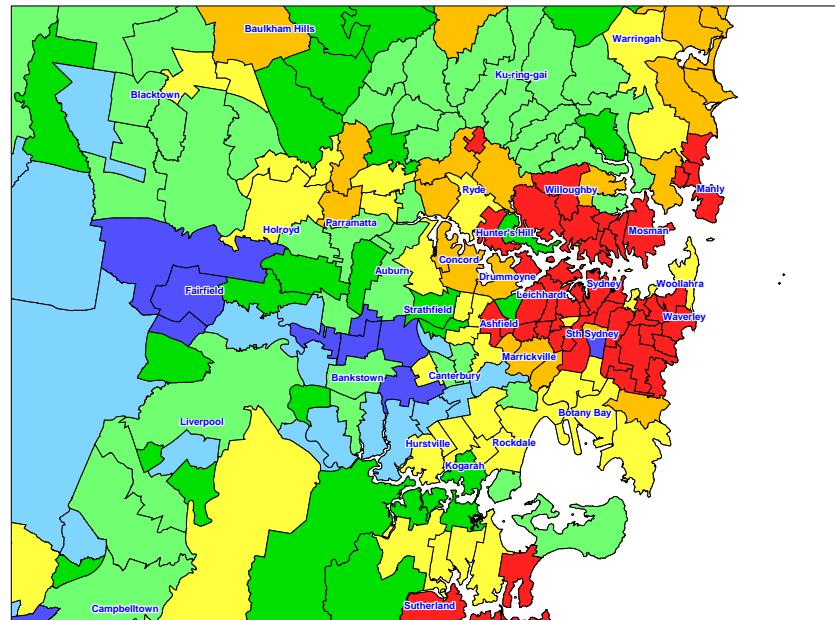


## Incorporating expected value

### Conversion Rates by Postcode

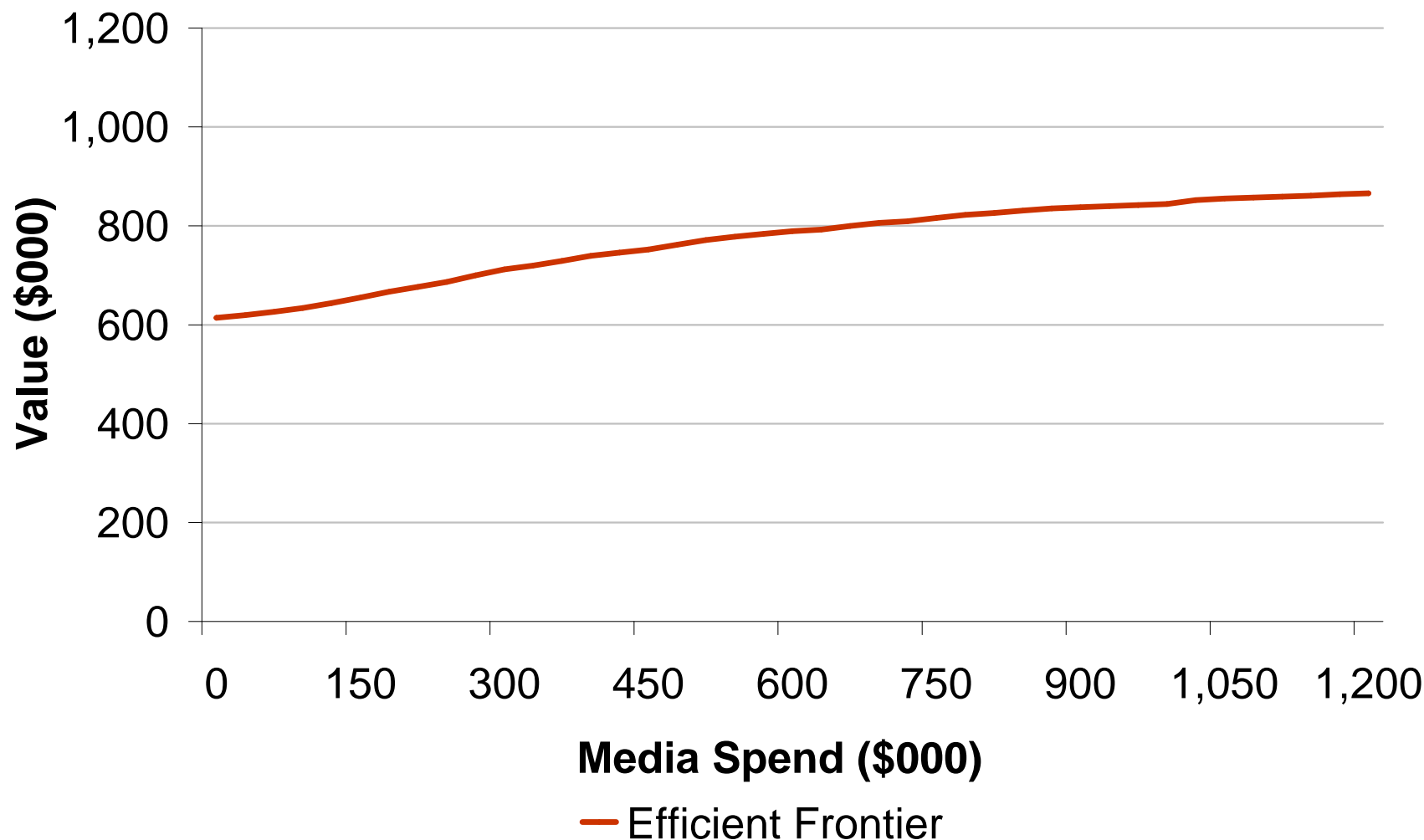


### Profit Margin by Postcode





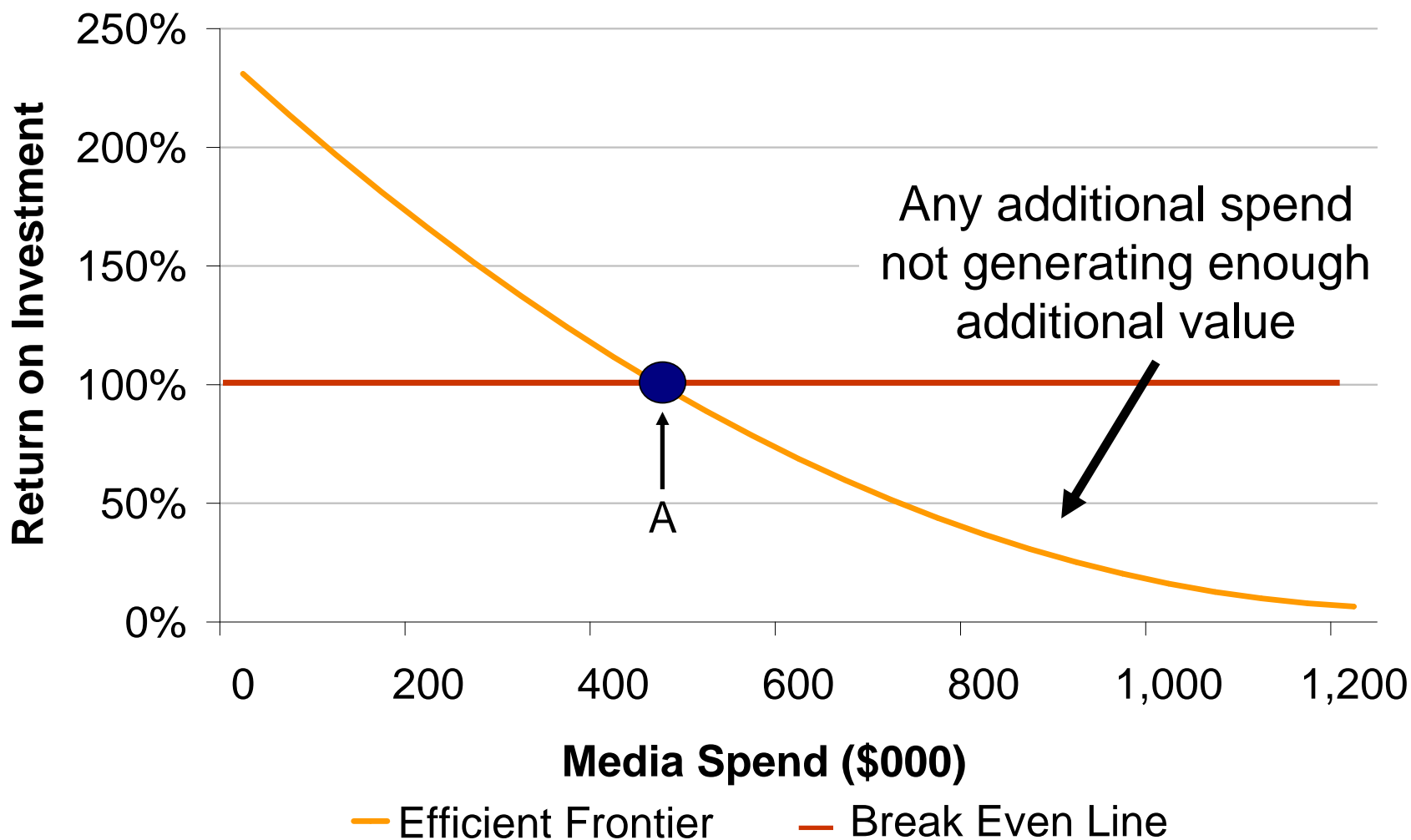
## Producing an expected value frontier..







## Use of the expected value frontier







## Conclusions

- Actuarial techniques can be used to generate real insights into media and price optimisation
  - Data
  - Modelling
  - Simulation
  - Optimisation
  - Incorporating Value