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Customer Sensitivity to Credit Risk Decisions

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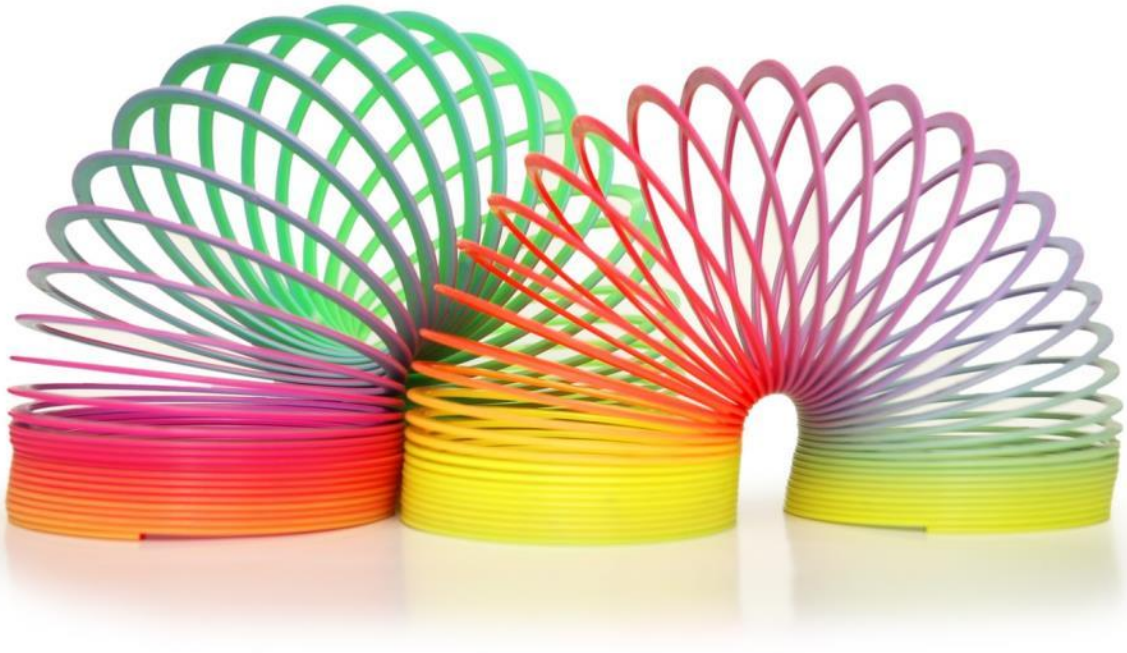
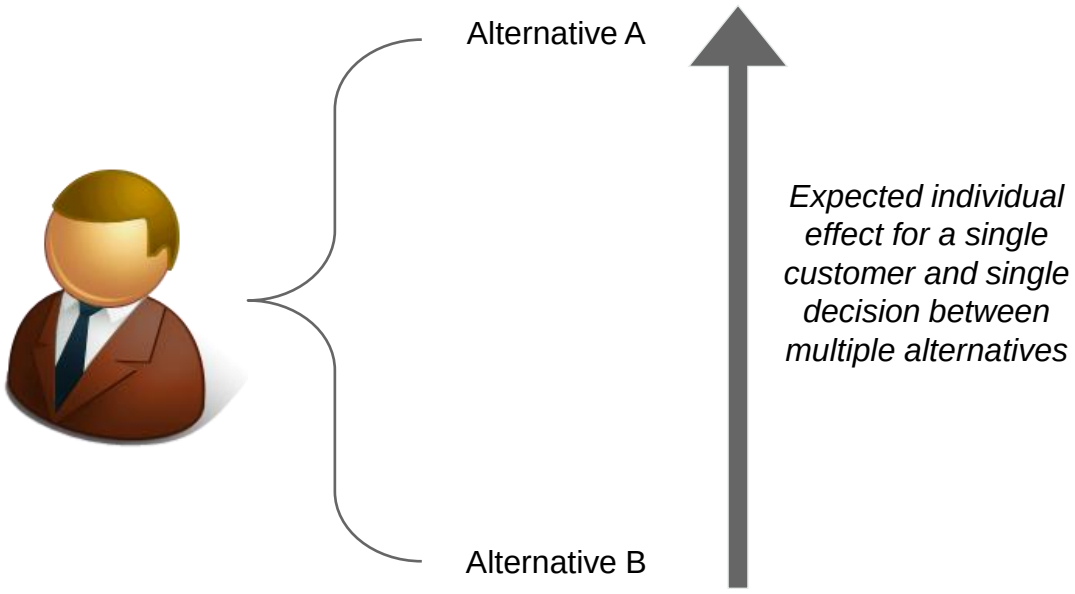


What is an Individual Decision Effect?

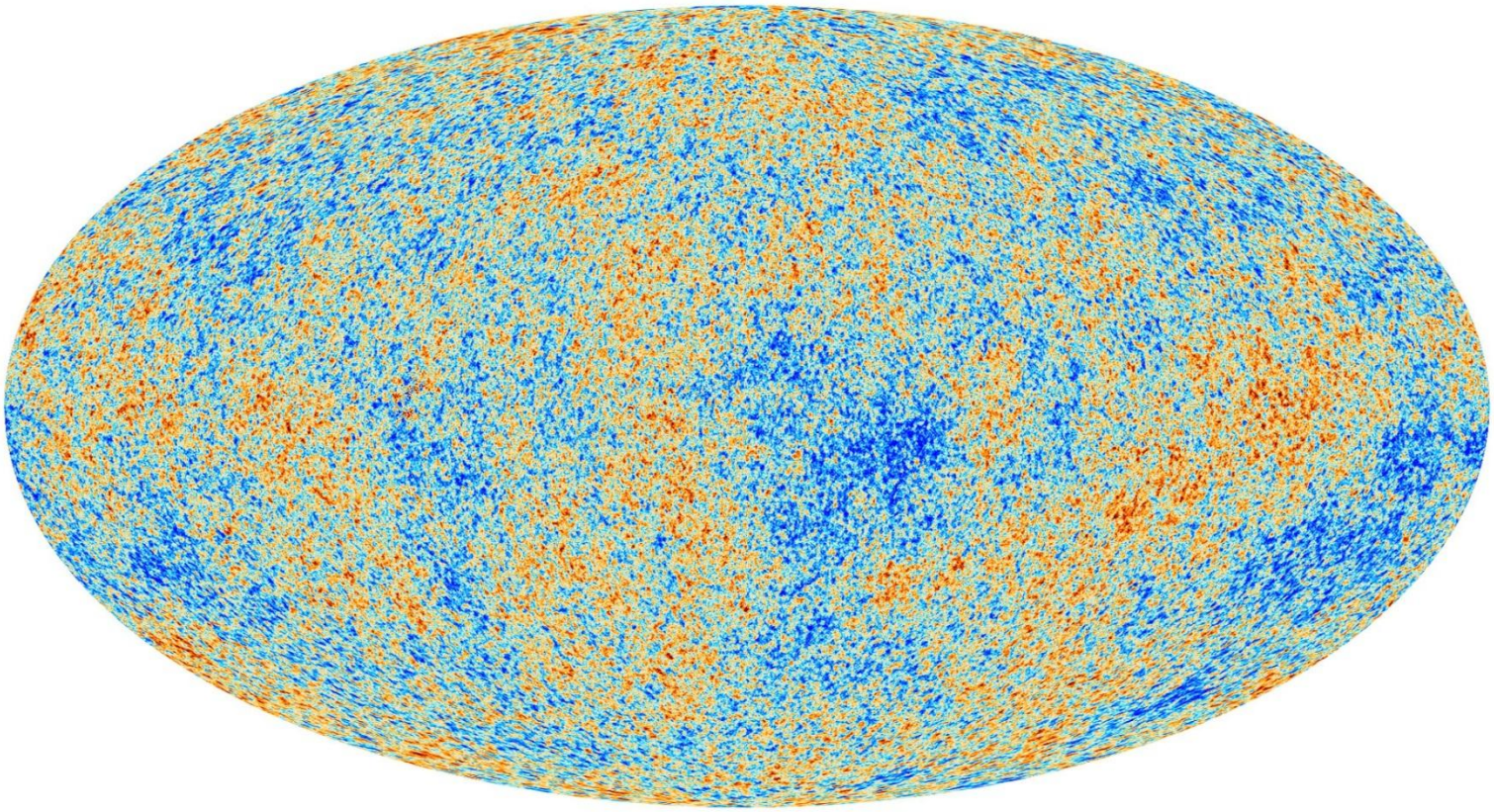


Function	Use
Churn	Target only people who respond favourably to the retention activity
Marketing	Target persuadable targets only
Risk decisioning	Offer the appropriate credit to maximise RoE
NBA	Comparing multiple options at the customer level to understand customer decision sensitivity
Pricing	Maximise uptake by offering the right price according to individual price sensitivity
Collections	Target only people who would have only paid because of this collections activity
Digital Attribution	Display media only to prospects where the media has a positive influence on conversion
Operations	Choose the right level of service on a customer by customer basis

***Goes by multiple disguises**: Uplift / Net lift / Causal effect / Action effect / Maximum differential / Incremental modelling….*

But didn’t we already solve that?

“Cosmologists studying a map of the universe from data gathered by the Planck spacecraft have concluded that it shows anomalies that can only have been caused by the gravitational pull of other universes”



Why predict customer sensitivity?

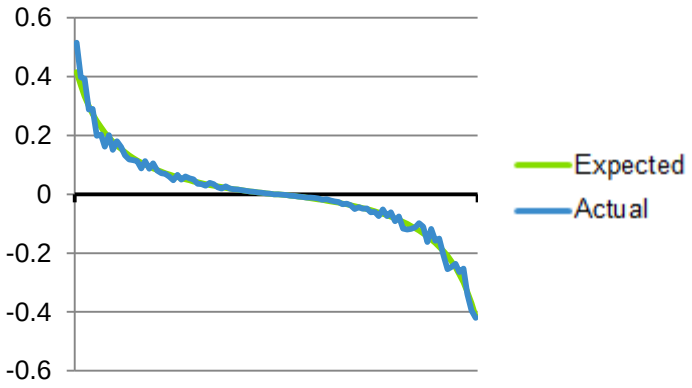
Key issues today	What needs to be addressed
1 Competing business objectives (revenue, default, profit, cost to serve, return on equity, capital requirements etc.)	Methods that can predict *changes* in business values due to customer-level decisions
2 Competing customer treatments (limit, authorisations, cross-sell, up-sell, pricing, pre-collections etc.)	Methods that can estimate the Individual Decision Effect of competing treatments
3 Competing methodologies (A/B testing, Champion / Challenger, online learning, machine learning)	A method of comparing multiple methodologies

Why predict customer sensitivity?

Method	Basic Premise	More information
A/B Testing	Randomised experiment to estimate the Average Treatment Effect (ATE)	Kohavi, Ron, et al. "*Trustworthy online controlled experiments: Five puzzling outcomes explained*." Proceedings of the 18th ACM SIGKDD international conference on Knowledge discovery and data mining. ACM, 2012.
Uplift Modelling	Maximising the uplift between two or more treatments	Rzepakowski, Piotr, and Szymon Jaroszewicz. "*Decision trees for uplift modeling*." Data Mining (ICDM), 2010 IEEE 10th International Conference on. IEEE, 2010." Guelman, Leo, Montserrat Guillén, and Ana M. Pérez-Marín. "*Random Forests for Uplift Modeling: An Insurance Customer Retention Case." Modeling and Simulation in Engineering, Economics and Management (2012): 123-133*."
Heterogeneous treatment effects	Segmenting randomised experiments to estimate the Average Treatment Effect (ATE) within segments	Grimmer, Justin, Solomon Messing, and Sean J. Westwood. "*Estimating Heterogeneous Treatment Effects and the Effects of Heterogeneous Treatments with Ensemble Methods*." (2013).
Incremental Response Modelling	Transforming binary response and treatment variables to measure the incremental response rate	Pechyony, Dmitry, Rosie Jones, and Xiaojing Li. "*A joint optimization of incrementality and revenue to satisfy both advertiser and publisher.*" Proceedings of the 22nd international conference on World Wide Web companion. International World Wide Web Conferences Steering Committee, 2013.
Model-based Recursive Partitioning	Tree-based method where each split looks for structural changes in the treatment / response model	Kopf, Julia, Thomas Augustin, and Carolin Strobl. "*The potential of model-based recursive partitioning in the social sciences-Revisiting Ockham's Razor*." (2010).

A model for assessing customer sensitivity effectiveness

- Estimated delta between treatment A and treatment B is calculated
- Sorted by descending delta
- Actual delta calculated within bins



$$Sensitivity = \frac{\sqrt{\frac{1}{n}\sum_{i=1}^{n} Y_i}}{\sqrt{\frac{1}{n}\sum_{i=1}^{n} (Y_i - \hat{Y}i)}}$$

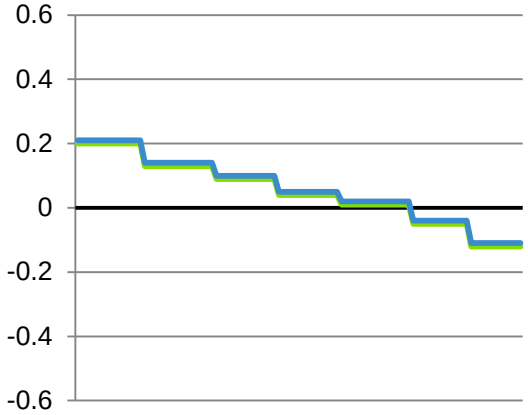
$Y_i = i^{th}$ percentile, **actual** sensitivity, by descending sensitivity

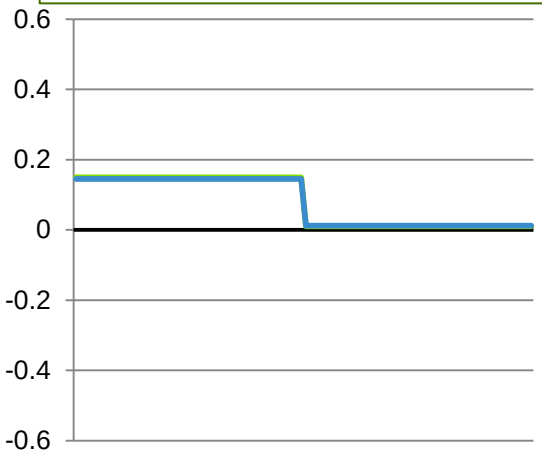
$\hat{Y}_i = i^{th}$ percentile, **expected** sensitivity, by descending sensitivity

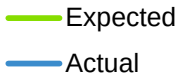
Customer sensitivity effectiveness resulting under different models - QUIZ

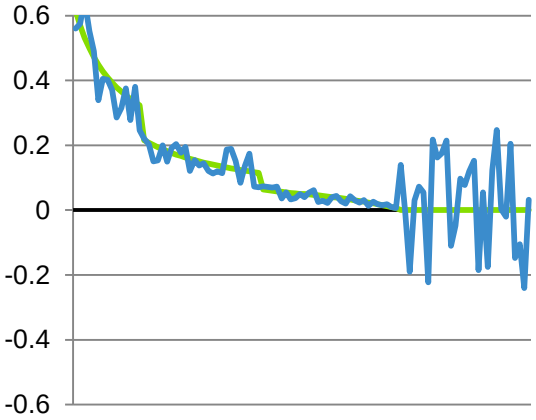
Which graph corresponds to a typical result from:

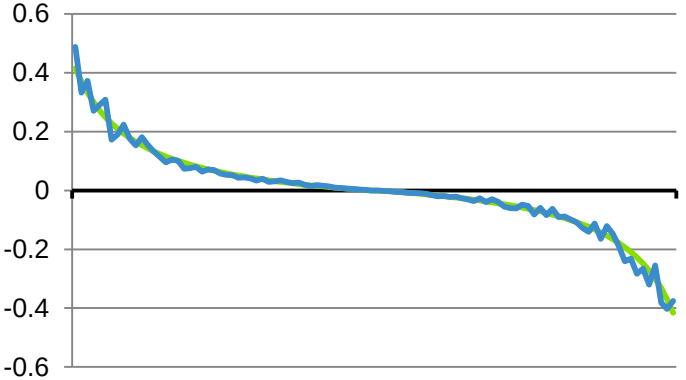
- Champion / challenger
- Uplift model
- Matrix segmentation (action effect)
- Differential response model
- A/B testing



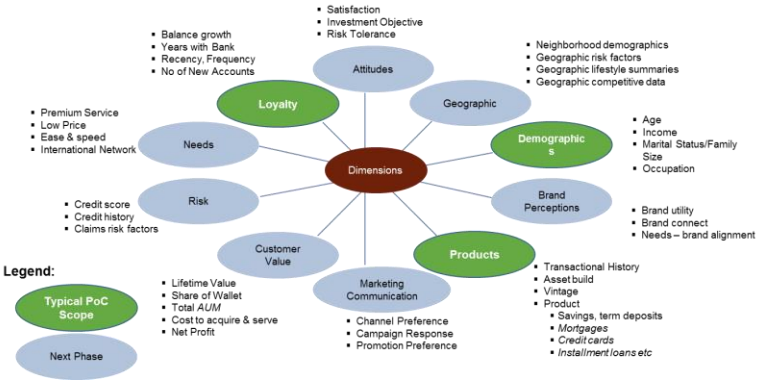






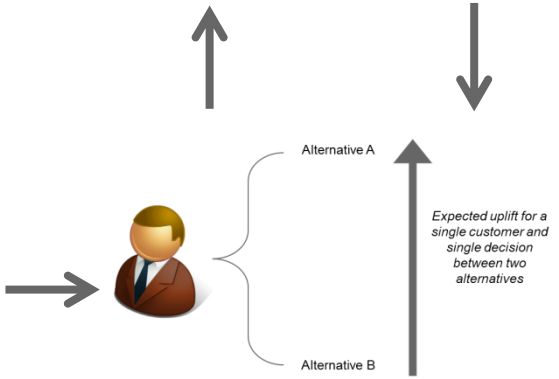


How to scale to Big Data?



Decision Levers

Pricing	**Campaigns**
Risk decisions	**Churn management**
Collections	**Digital Attribution**
NBA	**Operations**



Value Drivers

Increase Revenue

- Increase profit per product
- Increase CLV
- Increase usage

Decrease Cost to Serve

- Decrease risk
- Recover arrears
- Decrease cost to serve

A big data solution to address scale and complexity issues

Key issues today	Observations
1 Competing business objectives (revenue, default, profit, cost to serve, return on equity, capital requirements etc.)	Regression rather than classification required due to the requirement to estimate **economic impact**
2 Competing customer treatments (limit, authorisations, cross-sell, up-sell, pricing, pre-collections etc.)	Methodology needs to scale to multiple treatments, preferably without repeated modelling which increases variance
3 Competing methodologies (A/B testing, Champion / Challenger, online learning, machine learning)	Ensemble-based solutions provide the necessary predictive power and scalability

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