

The Reach-Frequency Dilemma

How marketers can optimise growth and ROI through marketing mix modelling



Executive Summary

Marketing leaders face a growing optimisation challenge: Should incremental media investment be used to reach more consumers or increase exposure among consumers already reached? While marketing mix models (MMM) are highly effective at measuring channel contribution, most do not reveal whether future growth is more likely to be driven by increased reach, greater frequency or a balance between the two.

TransUnion® MMM incorporates advanced reach and frequency modelling to isolate and quantify the impact of audience reach and ad frequency. This provides more actionable insights for media planning and enables more effective budget allocation.



A complex ecosystem

Today's marketers are up against growing pressure to demonstrate business impact while navigating an increasingly fragmented media ecosystem. Audiences consume content across a wide range of digital channels (connected TV, social media and video streaming), as well as traditional channels (radio, out of home and print), while retail media networks add a further layer of complexity.

This vast network of channels makes it more difficult than ever to understand how advertising exposure translates into business outcomes and, crucially, how media spend should be allocated to maximise ROI.

This challenge is reflected in recent TransUnion research. While **62%** of marketers reported having confidence in their performance metrics, confidence has largely stagnated¹. The research also found that:



54%

of marketers said confidence in their measurement had not improved during the last year

14%

of marketers (1 in 7) said their confidence had declined

60%

stated internal stakeholders question the validity of marketing metrics at least occasionally



¹ TransUnion & EMARKETER, Oct 2025.

The cost of uncertainty

For marketers looking to demonstrate impact, this is more than simply an analytics problem; it's a critical obstacle limiting their abilities to drive growth.

According to TransUnion research², 29% of marketers reported up to one-fifth of their marketing budgets have been reallocated or placed at risk because of concerns around measurement accuracy. It's therefore not surprising that 'proving incremental ROI' has become the leading measurement priority for 67% of marketers.

Demonstrating incremental returns may be the ultimate ambition, but in order to achieve that, marketers need to make the right investment decisions to maximise the impact of every incremental advertising pound spent.

Traditional marketing mix models are one of the most effective tools for understanding the contribution of media investment to business outcomes. However, while MMM can identify which channels are driving performance, they typically provide limited insight into how exposure is distributed within those channels.

This leaves marketers in an unenviable position: needing to demonstrate incremental ROI — but unsure whether to prioritise audience growth through reach or message reinforcement through frequency. Getting the choice wrong can be the single difference between delivering growth or wasted investments and missed revenue opportunities.

TransUnion Reach and Frequency models were developed to help address this gap.



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The reach-frequency dilemma



Marketing mix models answer one question particularly well:

How does investment in each channel contribute to business outcomes?

However, MMMs typically do not answer the following questions:

- How many individuals were reached for a given level of spend?
- How many exposures did those individuals receive?
- Where did marginal gains originate: reach expansion or frequency accumulation?
- What's the point of diminishing returns at the individual consumer level? In other words, when do additional ad exposures no longer have an impact?

TransUnion Reach and Frequency MMM addresses this gap by separately estimating the effects of reach and frequency within media channels, identifying the point of diminishing returns and then optimising investment across the overall media budget.

Insights from TransUnion's Reach and Frequency MMM are **directly actionable for media practitioners** and provide guidance for indirect buying as well.

A conventional MMM may indicate streaming video delivers strong ROI, but it won't clarify whether the optimal approach is to serve 3 ads to 10 million people or 10 ads to 3 million.

Traditional frequency recommendations based on ad recall will tend to overestimate optimal frequency because many consumers will need more exposure to consciously remember an ad than to purchase the product.

TransUnion Reach & Frequency MMM allows marketers to understand precisely how many people to target and how often they should see an ad on average to achieve the desired result, all while considering advertising exposure across all relevant marketing channels.

Integrating reach and frequency

Every advertising campaign has two core components: reach and frequency.

Reach

represents the net size of the audience (i.e., the number of unique individuals who saw an ad within a defined time period).

vs.

Frequency

represents the number of times an individual saw the same ad during that period.

When multiplied, reach and frequency yield total impressions. With a fixed budget, reach and frequency are typically in tension: Each incremental impression contributes either to expanding reach or increasing frequency among those already reached.

Social networks, video streaming services, online publishers and connected TV providers can often report reach and frequency separately or provide sufficient reporting to derive each metric.

While the concepts are straightforward, the relationship can be difficult to measure. Reach is a group-level statistic, whereas frequency is fundamentally an individual-level statistic.

At the individual level, a consumer is either reached or not reached. This creates collinearity challenges: When frequency is positive, reach is necessarily “on.” As a result, user-level multi-touch attribution (MTA) often evaluates outcomes as a function of impressions per person and assigns different values to incremental exposures.

In an aggregated MMM, reach is typically represented as the number of unique consumers reached within a given time period, while frequency is represented as the average number of impressions received by each reached consumer during that period. This is a necessary abstraction.

For example, an average frequency of three could reflect one person seeing an ad 11 times, while four people see it once, or five people each seeing it three times. Nevertheless, this simplification is often required to make the problem analytically tractable.

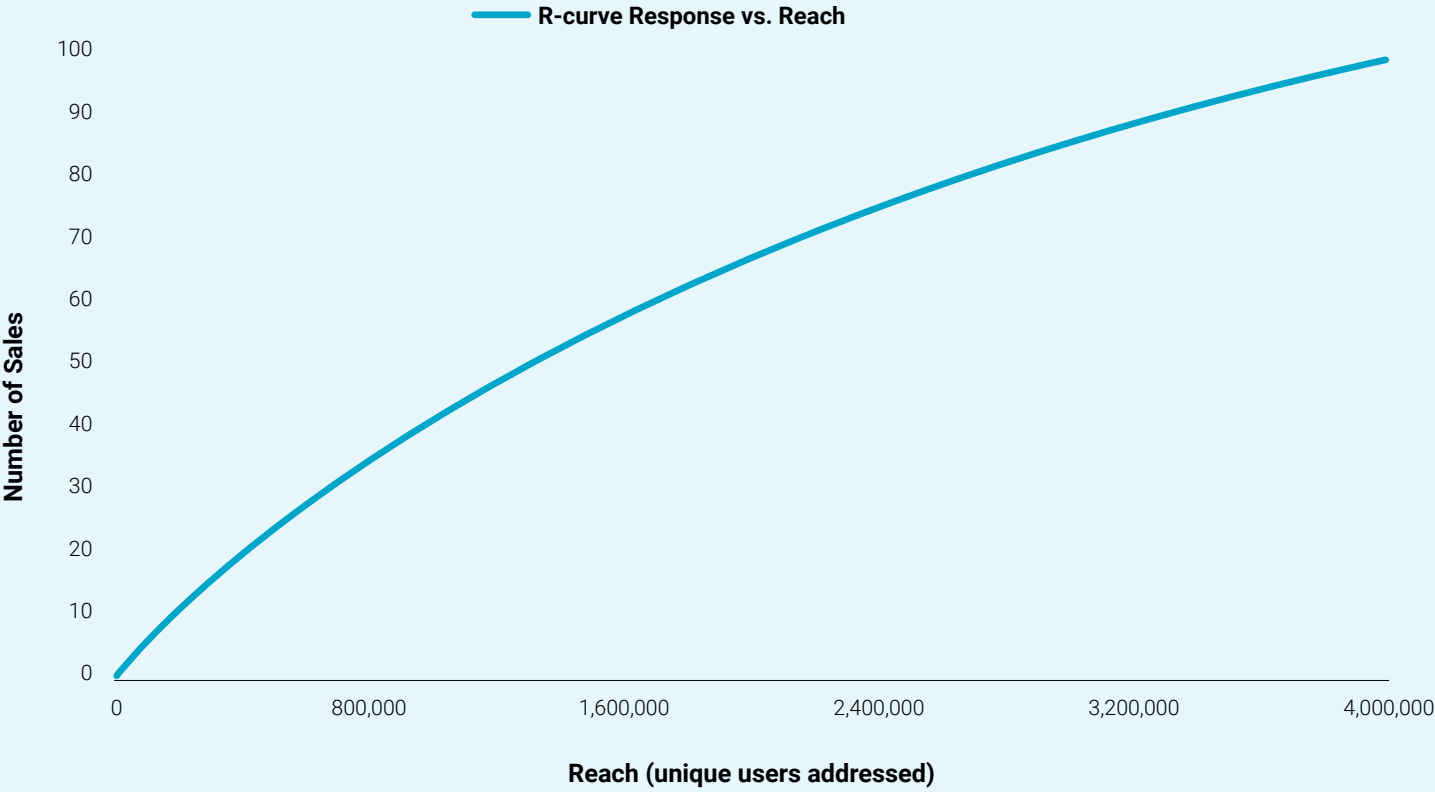


Mathematical foundations

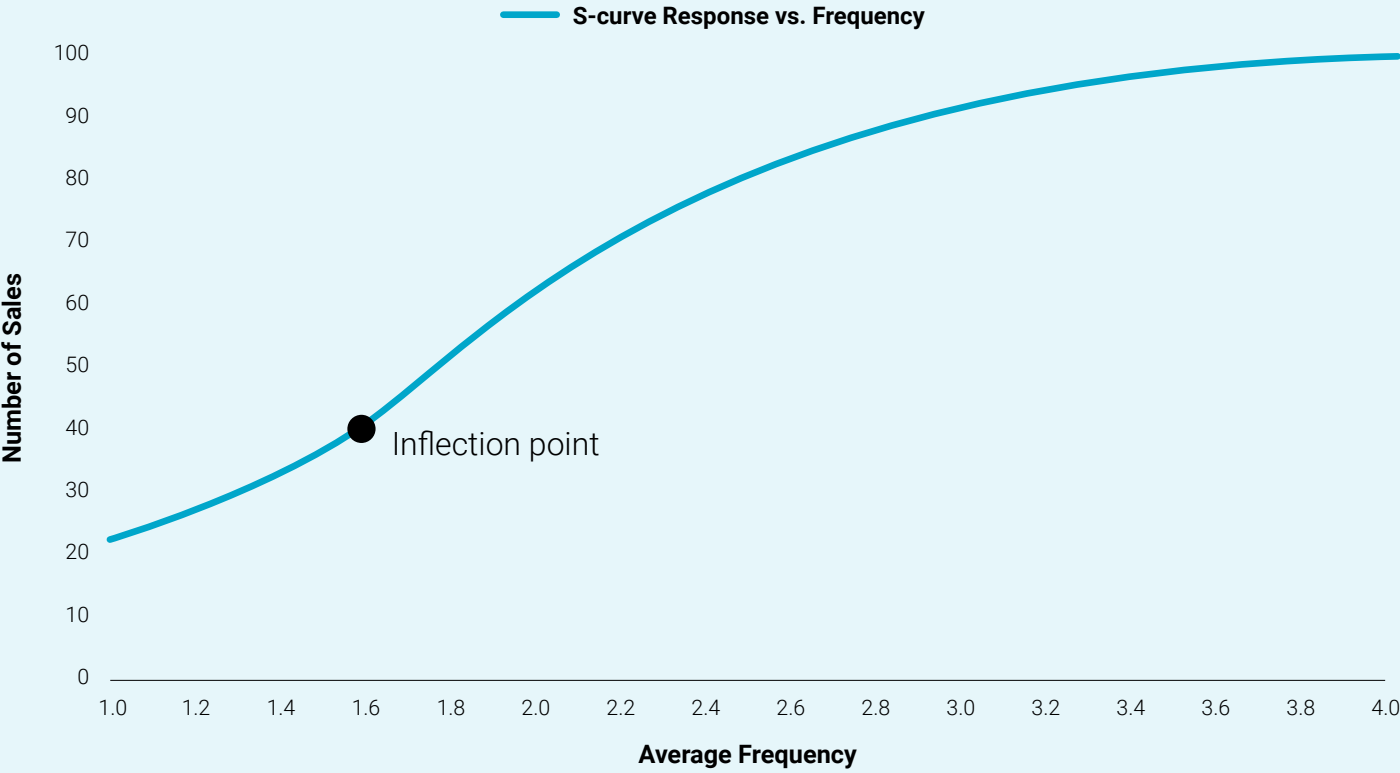
Saturation, ad stock and elasticities

There are two common approaches to modelling realistic saturation behaviour in media investment: r-shaped curves and s-shaped curves.

R-curves are used for channels with high impact from the first impression. Under an r-curve, each additional pound of spend generates **less** incremental impact than the prior pound.



S-curves are used when an initial investment is required to cross an activation threshold. In this case, each incremental pound initially generates **more** impact than the prior pound until the inflection point is reached; thereafter, the channel saturates and behaves more like an r-curve.



Graphs for illustrative purposes

A blended approach

The TransUnion methodology

As a default approach, TransUnion recommends using r-curves (specifically, logistic curves with Michaelis–Menten constants) to model media-channel saturation. This recommendation reflects evidence that, for established brands, even channels often viewed as threshold-driven (e.g., TV, radio and out of home) can exhibit diminishing returns from the initial investment.

In many categories, a substantial share of conversion probability is driven by baseline demand, which is reflected as the base in MMM. Effects that appear to increase with higher spend are often better explained as delayed effects over time, with outcomes peaking one or more weeks after a campaign.

For reach and frequency analysis, we propose using an **r-curve for reach** and an **s-curve for frequency**.

In theory, reach may not saturate if audience members are contacted uniquely and at random within a sufficiently large population. Empirically, increasing reach has led to diminishing outcome gains across all eleven of our reach and frequency case studies — even before the data were log-transformed and modelled with Michaelis–Menten constants. So, in practice, the ideal conditions for reach rarely hold.

Why this matters

The practical reason behind this phenomenon is that most brands and platforms apply some form of targeting, reaching higher-propensity consumers first.

In addition, depending on vertical and buying cadence, only a subset of the audience is in market, i.e. is looking to purchase, at any given time. Therefore, as reach expands, spend increasingly goes toward consumers who are less likely to convert, further diminishing incremental returns.



A blended approach (Continued)

The TransUnion methodology

For frequency, TransUnion conducted extensive analysis with alternative Michaelis–Menten constants to assess whether an r-curve specification was appropriate. A total of 76 different saturation constellation samples were tested to identify a possible optimal frequency constant. But this approach overstated the combined reach-and-frequency contribution by an average factor of 1.86 relative to impressions-based models. Accordingly, we use s-curves for frequency, implying that meaningful saturation occurs only after frequency exceeds a threshold level.

To estimate ad stock, TransUnion applies an algorithm that generates and evaluates thousands of candidate combinations of delay, carryover and retention to most accurately represent channel effects over time.

Elasticities are estimated using non-informative priors, initialising with a 50/50 contribution split between reach and frequency and iteratively fitting the model. Alternatively, informative priors can be derived from Shapley value analysis. This approach evaluates many different model setups and compares versions that include reach or frequency with otherwise identical versions that do not. By averaging how much predictive power reach and frequency add across all these comparisons, we estimate their overall contribution.

We propose the following model specification to incorporate reach and frequency into the TransUnion MMM:

$$Y_{t,c} = C_{t,c} \prod_{j=1}^n A_j \left(\frac{R_{j,t,c}}{k_{j,c}^r} + 1 \right)^{\beta_{j,c}^r} A_j \left(\frac{1}{1 + \left(\frac{F_{j,t,c}}{k_{j,c}^f} \right)^{-n}} \right)^{\beta_{j,c}^f}$$

Here, **Y** and **C** denote the total outcome and baseline outcome, respectively. Subscripts **t** and **c** represent time and cross-section; **j** indexes reach/frequency variable pairs. **R** denotes reach and **F** denotes frequency, each with its own saturation parameter (**k**) and coefficient (**β**). **A** denotes the TransUnion ad stock transformation, with the same ad stock parameters applied to both reach and frequency within each **j** pair.



Optimising reach and frequency

TransUnion's optimisation algorithms can recommend reach and frequency levels aligned to defined objective functions, including:

1 Optimise reach and frequency within a media touchpoint

Reach and frequency can be optimised within a single media touchpoint (e.g., branded online video). The touchpoint budget stays fixed; increasing reach necessarily reduces frequency and vice versa.

For any fixed budget, changing the allocation between reach and frequency can increase total contribution until an optimal balance is reached. The optimum is defined by the point where the marginal contribution of reach equals that of frequency. Beyond this point, shifting budget between reach and frequency no longer improves total contribution because each delivers the same incremental impact.

2 Optimise reach and frequency across the total media budget

When optimising across the full media budget, reach and frequency for a given touchpoint aren't constrained to trade off against each other. Budget can flow in or out of the touchpoint based on its marginal returns relative to other channels. The optimal allocation is reached when the marginal return of additional spend on reach or frequency within the touchpoint equals the marginal return available from alternative media investments. At this point, allocating more budget to either reach or frequency within the touchpoint would reduce overall efficiency as higher marginal returns could be achieved elsewhere.

Channel allocation: One size doesn't fit all

When reach is preferred vs. when frequency is preferred

Across all MMM datasets analysed for reach and frequency, clear differences emerge between media channels. Generally, for online video – where a single impression can have a high impact – maximising reach is generally preferable, though it may be constrained by target audience size. Paid social, on the other hand, often delivers only partially-viewable ads and therefore tends to benefit more from higher frequency than extended reach. TV can achieve extremely high reach, but this is inherently limited by the size of the audience currently in-market. TransUnion has supported domestic and global clients to get the reach-frequency balance right across a wide range of scenarios – demonstrating reach and frequency reallocations can materially improve performance.

Reach-frequency best practice. Examples from case studies with TransUnion clients:



Annual retail events – online video

TransUnion analysis of big retail milestones (e.g., Black Friday, Christmas and Valentine's Day) shows both reach and frequency should be increased in the weeks leading up to the event, with tighter frequency controls applied during the holiday week itself.



Frequency beats reach – paid social

Given limited on-screen real estate and shorter attention spans on mobile devices, increasing frequency among priority audiences is often more effective at driving incremental purchases than expanding reach to first-time viewers.



Targeting wealthy audiences – TV

For affluent target groups, the optimal frequency can be relatively low, while effective reach is constrained by audience size and the number of individuals in market at any given time. As a result, TV benefits from consistent, year-round flying with minimal reliance on high-intensity bursts.

Key benefits of integrating reach/frequency models into MMM

Reach and frequency effectiveness varies considerably by industry vertical, client and touchpoint. Analyses of reach and frequency don't need to be limited to media channels. They can also be applied across other dimensions, such as targeting, audience and even creative. The key benefit is simple: Reach and frequency modelling elevates MMM beyond channel recommendations to provide strategic execution guidance, adding a level of actionability typically associated with multi-touch attribution modelling. This approach delivers significant value to both campaign practitioners responsible for budget allocation and activation planning and marketing leaders seeking clear, evidence-based proof of marketing effectiveness for internal stakeholders. While reach and frequency modelling each provide valuable insights on their own, their combined application delivers substantially greater impact.

Reach models

Grow audience penetration more efficiently and cost-effectively

Maximise audience reach with a clear understanding of how many additional unique consumers can be reached with every incremental pound invested. This enables smarter budget allocation and more efficient scaling of campaigns.

Frequency models

Optimise ad frequency to reduce wastage (frequency curves)

Understand the impact of repeated ad exposures through frequency response curves, identifying the optimal frequency level that drives results while avoiding oversaturation and wasted spend.

Reach and frequency together (TransUnion MMM)

Help maximise returns from existing budgets

Identify the point at which additional impressions move from driving incremental value to generating diminishing returns, ensuring investment is concentrated where it delivers the most impact.

Turn insights into action

Develop optimised, value-led activation plans across the entire media mix. Understand the most effective balance of reach and frequency across different investment scenarios, accounting for varying media costs and identifying when broad, targeted or high-frequency strategies are most appropriate.

Provide clear evidence of marketing impact

Equip marketing teams and senior stakeholders with robust, data-driven recommendations that demonstrate both the effectiveness and efficiency of media investments, supporting stronger planning, optimisation and budget justification decisions.



Moving from 'what to do' to 'how to do it and why'

This approach enables operational decisions within media teams, such as budgets, caps and pacing, to map directly to econometric results from MMM.

Historically, media planners have had to interpret MMM outputs without execution-level guidance. An MMM might recommend "increase paid social by 10%," but that still leaves many tactical questions unanswered, such as:

- Should incremental spend be directed to new audiences?
- Should frequency caps be adjusted?
- Should creative be sequenced?
- Should exposure be limited to two impressions per person or increased to five?

TransUnion's approach replaces assumptions with measurement, transforming MMM from a tool that identifies the right approach into one that explains how to maximise marketing and channel effectiveness, with clear evidence for why.

TransUnion Reach and Frequency modelling versus traditional MMM:

TransUnion MMM with reach and frequency modelling

- ✓ Full tactical guidance
- ✓ Exposure recommendations
- ✓ Execution rules for planners

Traditional MMM

- ✓ Channel-level guidance
- ✓ Spend recommendations
- ✓ Insights for media planning



TransUnion: A global data and marketing leader

TransUnion brings more than 20 years of marketing analytics experience across the UK and Europe. We work with some of the world's most well-known brands, helping them better understand and maximise the effectiveness of their marketing.

Our MMM solution has been recognised by Gartner as an industry-leading 'Magic Quadrant' solution for two consecutive years. Independent analysts have also highlighted our rigorous model validation, collaborative approach and commitment to continuous solution improvement.

Because we're neither a media buyer nor seller, our analysis is fully transparent and independent. This enables marketers to gain a clear understanding of performance, make more informed investment decisions and allocate budget to the channels most likely to drive results and maximise ROI.

30+

Presence in 30+ countries, across 6 continents.

1,000+

Supports over 1,000 organisations to enhance their marketing effectiveness, including globally recognised household names.

20/50

20 of Ad Age's top 50 Advertisers trust TransUnion for their marketing measurement.

\$100B+

TransUnion measures and optimises over \$100B+ in ad spend for clients worldwide.

TransUnion Marketing Solutions

Helping leading organisations worldwide transform marketing and media effectiveness.



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