Numerator

WHITEPAPER

Total Commerce Panel

Statics, Projection & Calibration

Executive Summary

A static is a requirement used to identify consistently reporting panelists to include in an analysis. This white paper explores considerations that go into static definition as well as how the resulting data is projected and scaled up to reflect the total number of households for the country (e.g., Total U.S. levels).

After a multiyear investment in innovation to evolve with the modern consumer, 40%+ of our consumer trips are collected digitally and we've made strides in panelist participation and calibration technology to better represent consumer activity across the total market. This has allowed us to launch the Total Commerce Panel setting new industry standards:

- BIGGER - An expanded panel of 150K households that are representative of the U.S. population.
- BETTER - Increased stringency in our panelist requirements:
    - Each panelist must submit a minimum of 2 trips per month for 12 consecutive months, while competitors include panelists with less consistent participation in their panels (e.g. 10 of 12 months). In reality, our panelists average 30+ trips per month.
    - A retailer diversity threshold of a minimum of 5 unique FMCG retail banners reported during the year (on average, we see 50+ banners per year).
- BEYOND - Moving from omnichannel to omni everything
    - Updates to our OmniCalibration Engine, which preserves natural consumer behavior by ingesting multiple benchmark sources that represent the total market as opposed to force-fitting to POS, including more sources and more levels of calibration.

Introduction

This document is intended to provide general education and details around how Numerator handles statics, projection and calibration for the Total Commerce Panel. In this document we will cover:

Basics of Statics

What is a static and why is it used?

Before using or processing the data for a panel data analysis, it is important to ensure that all of the panelists included in that analysis have been consistently reporting over the entire analysis time period. For example, if a panelist is only providing data for part of the year and then drops off the panel (or stops participating and sharing their data), their full purchasing behavior would not be captured in the analysis (this might lead to incorrect assumptions or conclusions — for example, that this household left the category when, in fact, they just didn't provide their purchasing information in the second half of the year).

The term "static" panel is used to reference a consistent set of panelists reporting over the duration of the analysis time period. Numerator's large panel allows us to use a much more rigorous static definition which supports data quality.

For this reason, when panel data is processed, it is processed using what is called a "static." This just means that the data is being processed using a static (stable) group of consistently reporting households. For a Numerator panelist to be included in an analysis, that household must report at least two trips every month in that year (2x12/12).

How does our static requirement compare to our competitors'?

We use a "tighter" (more strict) annual static vs legacy panels. The "tighter" the static (such as having to be active at least twice in 12 of 12 months), the harder it is for a panelist to qualify, but it also ensures higher quality data (less likely to misrepresent purchasing by a panelist not reporting what they bought or where they shopped). In contrast, our competitors' panel (National Consumer Panel (NCP)) typically uses a 10 out of 12 (10/12) static with a one trip requirement which means that, to be included in their dataset, a panelist had to report only one purchase in ten out of twelve months of an annual period. This means a panelist can skip reporting almost 20% of the time but still be included in the NCP panel analysis.

What are our latest innovations in static requirements?

The primary purpose of applying a static requirement to panel data is to ensure consistent reporting and high compliance from panelists over the analysis period as that produces higher quality data and insights. We continue to adapt to ensure our panel data evolves with the modern consumer in order to better reflect their

natural behavior across the total market, because we believe that it is critical to impose the right requirements to reflect current consumer behavior and create a user experience that fosters ongoing engagement and participation over time. As such, we have raised the bar even further for panelists to qualify for our Total Commerce static panel.

Quality controls have been put into place for the Total Commerce Panel to prioritize users who demonstrate the following, more representative shopping behaviors:

1. **Consistency:** A minimum of at least 2 *qualified transactions* per month of the static (This replaces the previous requirement of only one trip reported per month)
2. **Diversity:** Qualified transactions from a minimum of 5 distinct *qualified retailers* during the static period (A qualified retailer is any retailer that has an FMCG banner or is a key .com retailer. We now consider both online and paper receipts from qualified retailers. Critically, we do not consider every banner under a qualified retailer. A qualified transaction must come from a banner of a qualified retailer who has a parent channel of FMCG or ecommerce.)
3. **Representativeness:** We compare the total spend of each household to the average total spend of households of the same size and in the same income bracket. If this household has a total spend which is significantly higher, or significantly lower than the average, we consider it an outlier and exclude it from the static

Despite the fact that we use a tighter static than our competitors (like NCP) and have now imposed even stricter standards for our static requirements, we still have significantly more panelists in our Static Panel (150K for Numerator's Total Commerce Panel vs 65K for NCP based on an annual static). As we expand the length of time period for the static, we continue to have a more robust panel, for example, our Static Panel size over a 3-year period is still significantly larger than NCP can manage to deliver over only a one year period (see Figure 1 below).

150k
Numerator Total Commerce Panel

65k
NCP Brick & Mortar Scan Panel

Figure 1

Numerator Static Panel Size at Various Static Period Lengths

PERIOD LENGTH (STATIC)	NUMERATOR STATIC PANEL SIZE
1 year (2x12/12)	150k
2 years (2x24/24)	110k
3 years (2x36/36)	80k

It is important to emphasize that both static sample size and amount of historical data (longevity) are key factors in evaluating the health and usefulness of a panel to provide the right consumer insights. Numerator's Total Commerce Panel has always been a consumer-centric, single-source omnichannel panel, meaning the same households are providing us with their Brick & Mortar and eCommerce purchases over time (and we select

our static sample from these consistently-reporting households). In terms of historical data for our Total Commerce Panel, we have four years of history for the 150K household panel design (from January 2019 forward). (We do have panel data back as far as 2015, please contact your Numerator Consultant if you have a need for more history for available options.)

Numerator's volume of participants
+
Long, continuous participation over time and across channels
=
Unparalleled ability to understand switching behavior

With a true consumer-centric, single-source omnipanel data source (like Numerator's Total Commerce Panel), disparate data sources with different reporting households do not have to be stitched together to provide the holistic view of consumer behavior marketers require. This also makes static selection a much easier process.

How are statics applied to panel analyses?

While the aforementioned requirements are always enforced for a household to be selected into the static panel, statics are applied at the time of report run (for example, when we process reports through the Insights platform) to ensure the right households are included in the desired analysis. Typically, Numerator applies a 2x12/12 static over reports covering analysis periods of one year or less, however, there are some deviations to this process depending on the specifics of the analysis.

For example, when conducting trended panel analyses covering multiple years (to compare year-over-year performance), we would generally recommend running a 12 of 12 static for each year individually (or selecting rolling 52-week report periods) vs. running a static that covers all years (e.g., instead of running a 3-year static, we would use three individual annual statics). Using an individual annual static makes sense for these types of trended analyses as we are looking for a "point-in-time" read, so we only need to require the panelists who actively participated throughout that same year to be used for the projection (vs. having them participate for a longer period like 3 years). This provides higher static sample counts for the report while still ensuring the data is based on consistently-reporting households.

However, if you are conducting an analysis where it is important to follow the same households over time (such as a Lost, Retained, New analysis), it is necessary to set the static for the entire time period to ensure households have been consistently reporting over both the Pre and Post periods used for the analysis. Although this will lower static sample counts somewhat for these types of analyses, it ensures that conclusions drawn from the analysis trace to actual purchasing behavior changes within a given household (vs. being caused by churn).

As other competitors try to stitch together disparate data sources to try to get to an "omnichannel panel", they will fall short both in terms of sample size and historical data in being able to provide the omnichannel view.

What are the static requirements applied to each time period?

Numerator's Insights platform automatically selects the static requirement needed for each report depending on the report model you are using and the length of the report time period, so there is nothing that a user needs to know or do. That being said, it is sometimes helpful to understand what is happening "behind the scenes."

There are three types of statics that we use, depending on the Insights report being run, each of these will be explained here. These three types of statics are called:

- Single
- Linked
- Double

A **Single Static** is typically used for reports that are run on a single time period. Generally, a 12 of 12 (2x12/12) static requirement is applied to each report that is based on a single time period of one year or less. This annual static requirement ends on the calendar month in which the report end date falls. For example, if running an Insights report for Calendar 2022, the static would be based on January 2022 through December 2022 (so each panelist included in the report would have had to submit at least two receipts in each of those 12 months).

Similarly, if the report period is Q1 2022 (January through March 2022), a 2x12/12 static would be applied to the report (April 2021 through March 2022).

Numerator Insights always pulls a minimum 2x12/12 static even when the report dates are shorter. This is the highest consumer insights panel standard on the market.

To reiterate, reports using a Single Static covering periods that are one year or less in length use a 2x12/12 static (that is, whether the time period is one week, one month, one quarter, six months or one year the static would be based on a 2x12/12 static that ends during the last calendar month included in the report time period). Single time periods greater than one year would follow a similar pattern. For example, a report run over an 18-month period would apply an 2x18/18 static, a report for a 24-month period would apply a 2x24/24 static requirement, etc.

A **Linked Static** is used for reports where we are interested in following the same households over time, typically from a Pre Period to a Post Period to see how their behavior changes (the Buyer Loyalty Flow, Existing Brand Source of Volume and Lapsed, Repeat, New reports use a linked static). The Linked Static uses the same set of static households for both periods -- panelists who met the criteria in the Pre Period and the same group of households in the Post Period to examine their behavioral change from Pre to Post Period. For example, if we want to know how many buyers who purchased a brand in Calendar 2021 went on to continue purchasing the brand in Calendar 2022, we'd want to use a Linked static. In this example, households included in the analysis would have to have met a 2x12/12 static in Calendar 2021 AND a 2x12/12 static in Calendar 2022 to be included in the analysis.

A **Double Static** defines two separate static groups based on each individual time period. That is, the static for each period is selected independently from each other. A Double Static is recommended when you are running trended metrics. In essence a Double Static is the same as running two individual Single Statics.

The Double Static is used in reports where we want to look at a year-ago period or build benchmarks based on the equivalent year-ago period. For example, if we want to look at what the average consumer behavior looked

like in Calendar 2021 and compare that to what it looked like in Calendar 2022, we'd use a Double static (again, think of this as two independent Single Statics that are applied when we run the reports — so, a 2x12/12 static in 2022 would be used for the 2022 data, but a 2x12/12 static covering 2021 would be used for the 2021 data). The Double Static makes it more efficient to get to the year-ago comparison data without having to prompt a second report with the year-ago time period.

Side note: A Double Static is used vs a Linked Static when we are examining average, aggregate consumer behavior in one period compared to another. For example, if we want to know what the penetration level was for a brand in the current year and compare that to what this brand achieved last year. In this case, we do not need to look at the same households over time, we just want a marketplace ("point-in-time") read. Using a Double Static provides a better read for this application as well as higher buyer counts because panelists just need to be active participants within the individual year (2x12/12 in one year, whereas if we used a Linked Static, panelists would have to be active over two years to qualify even though we are reading only one year of data at a time). This allows us to accurately project to each period while maximizing the buyer counts. It also provides a processing efficiency for users in the Insights platform, as they can get to the comparison data without having to prompt separate reports.

TYPE OF STATIC	DESCRIPTION	SAMPLE USE CASE
Single Static	Used to measure behavior of a consistent group of households over a continous period	Typically used for reports in a single time period
Linked Static	Used when evaluating consumer behavior from one period to another; follows the same households over time	Lapsed, Repeat, New reports; Buyer Loyalty Flow, etc...
Double Static	Used in reports with year-ago benchmarks; provides two individual Single Statics within the same report	Provides efficiencies when trending data, such as looking at year-ago benchmarks

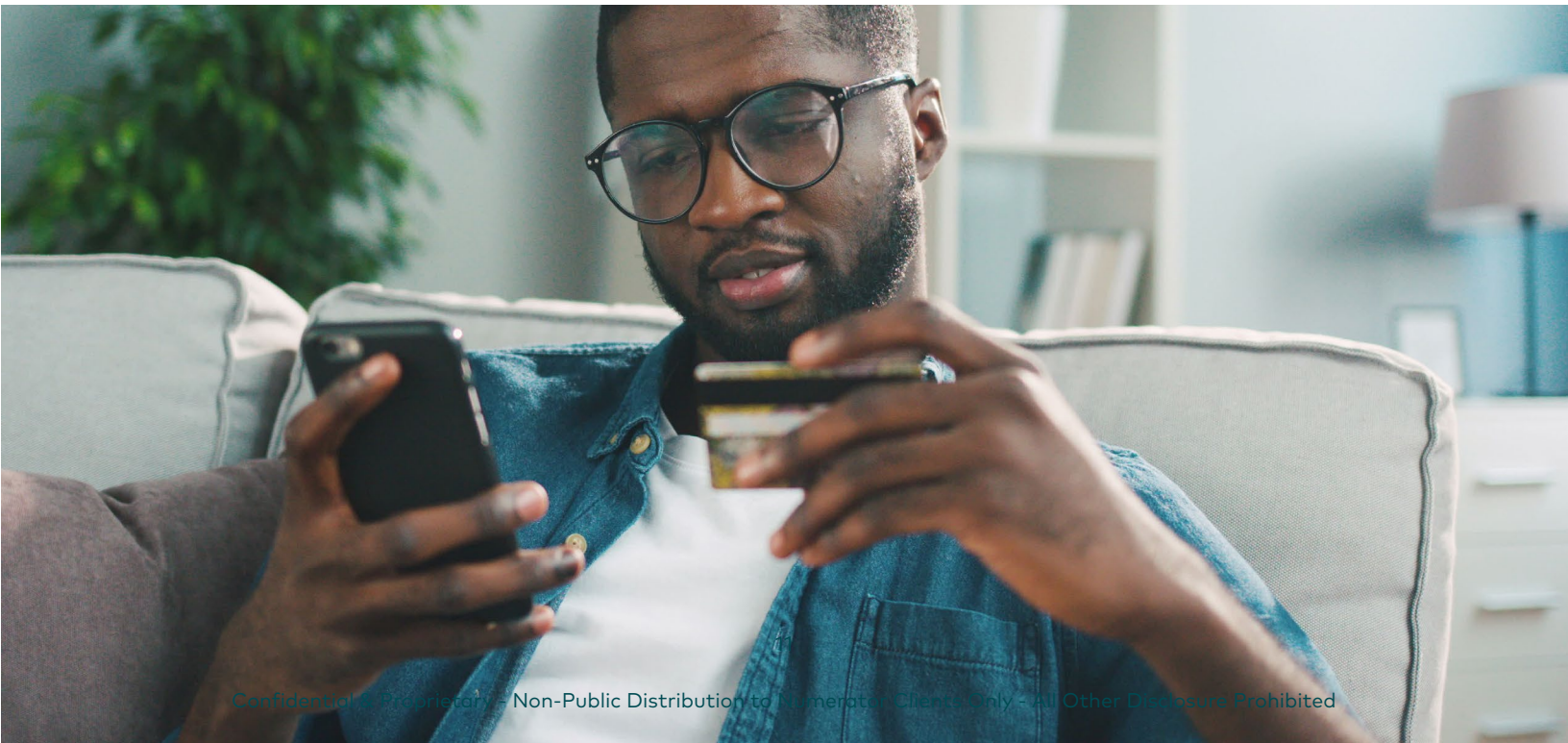
Panel Maintenance and Statics

The Static Panel refers to households that meet the static requirements, allowing their data to be used for analyses and reports. A primary challenge for all household panels or data sources requiring ongoing participation from the same households is maintaining the integrity and standards of the static panel as participant engagement changes over time.

All panels have a certain number of panelists who will fall out of the panel over time (such as those who either decide not to participate anymore or those who become less active participants and will no longer meet the static requirements for reporting purposes) – this is referred to as panel "churn." Panelists that need to be replaced (be backfilled for "churn") are done so in a way that minimizes disruption to trends and maintains the demographic/geographic balance of the panel. (We sometimes refer to this selection process as "balancing" the panel.)

How are "Churned" households replaced?

Churn is managed on a **daily basis** for the Numerator Total Commerce Panel to maintain the high standards of the 150K household panel design. Each household that we churn from the static panel needs to be replaced with a "like" household to maintain the demographic/geographic balance of the panel and to minimize trend disruptions.



Numerator currently has over 500,000 monthly active users participating, significantly more households than is required for the 150K static panel design. This means we have many active users who meet our strict static requirements "waiting in the wings" that we can select from when we need to replace (or "churn") a Static Panel household. When a new household is brought into the Static Panel, we also bring in 12 months of back data for that household. (In fact, we have a substantial number of active users who have already provided us with monthly receipts over the past 12 months and meet our 2x12/12 static requirements, making it quite easy to fill in any households we need to "churn" in the static panel in a seamless manner.)

> *Side note: It is a significant advantage to have such a large pool of participating households. Within the 500K+ household pool, we select the Static Panel (150K households) as well as have our Test Panel, a huge pool of households for Surveys and a substantial number of "JV Panelists" (active and interested participants who meet all our minimum static requirements for quality control over at least a year). This enables us to replace those households that "churn" from the Static Panel, as we have a full year of "instant back data" for these households to minimize trend disruption while also keeping our static sample high.*

What is a grace period and how does it impact statics?

Since panel data sources directly from consumers (households), it is important to give them an appropriate amount of time to provide their data. In the case of Numerator, we give our panelists a 14-day grace period or window to upload their FMCG paper receipts. (As each receipt has a purchase date on it, we then code the transaction to the appropriate purchase date in the data.) To accommodate the grace period when selecting statics, there is typically a two-week lag for a time period to be able to be selected within our Insights Platform.

In some cases, like with our Early Read data, we process data before the 14-day grace period has closed out for a month. In this case, we will still impose our 2x12/12 static requirements on the data and then use the partially processed data and historical benchmarks to project out a simulated view of the most recent time periods. Clients continue to stress the value of Early Read data as a directional indicator especially during big retail events such as Prime Day, Black Friday, etc.

Projecting and Calibrating Static Data for Panel Analyses

Since panel data is based on a sample of households, after we have defined the group of static households to use for a given panel analysis, we then need to project and scale that sample up to represent the total universe or total market (in most cases, to represent Total U.S. household purchasing and shopping behavior). This is done by demographically weighting, projecting and scaling the data to align to the US Census.

How / why is panel data demographically weighted?

To build a nationally-representative panel, demographic and geographic targets are typically set based on trying to get the "raw" (unprojected) panel composition to mirror the Total U.S. population as closely as possible.

Not all types of households are as willing to participate in a panel as others, participation may vary depending upon the type of household. For example, certain types of households, such as Millennials, Ethnic, Low Income, and very High Income households are very difficult to recruit and maintain in a panel.

> *Side note: This problem is exacerbated when there is a higher burden placed on the panelist to provide their data and participate. For this reason, Numerator's low burden collection methodology (physical and digital receipt collection) does a much better job in recruiting, maintaining and representing the shopping behavior of these important demographic groups compared to legacy panels like NCP (where their panelists have to scan in every UPC code from every item purchased individually through a tedious process).*

Once the Panel Data is collected, (and after the "static" is applied), the data is then demographically weighted to represent Total U.S. households. That is, each panelist is given a demographic weighting (based on their geographic and demographic characteristics) to better align to the actual Total U.S. distribution. (The same technique is used to provide data at the Census level.) Numerator's strict panel requirements and higher user engagement allows us to start with a representative static panel, requiring less weighting and projecting. After demographic weighting has been completed, other factors are applied to project and scale the data up to represent Total U.S. purchasing and shopping (more of this in a subsequent section).

To recap, the "raw" panel is continuously balanced to align to Total U.S. demographic characteristics as much as we can, the static panel is then demographically weighted to get us the "rest of the way there" to more closely mirror the actual U.S. distribution, and finally factors are applied to project and scale the data up to Total U.S. levels.

How are the demographic targets defined?

We use U.S. annual census targets to set the demographic weights. Since these targets change each year due to the estimated change in the U.S. population, month-by-month estimates have been built into the system to build to the next year's target from one year to the next to smooth out the change over the course of the year.

DEMOGRAPHIC VARIABLES INCLUDED IN THE DEMOGRAPHIC WEIGHTING SCHEMA

Gender (App Owner) (used for Head of Household)
Age
Ethnicity
Household Income
Household Size
Presence of Children under 18 living at home
Census Division
Urbanicity

How do we assign demographic characteristics to a panel household?

When panelists download the Receipt Hog app, we send them MicroSurveys (via the app) to ask them questions about the demographics of their household via the app. More detailed questions are asked when the panelist first joins including:

- Gender identification
- Birth date
- Address
- Employment status
- Household income
- Education
- Spanish/Hispanic/Latino origin; If yes, country of birth and level of acculturation questions
- Ethnicity
- Marital status
- Number of Household Members (household size)
- Number of children in household

Not all demographics change from year to year, but it is important to update the demographics that do have a tendency to change (like income, household size, etc.). We identify these needed changes using short surveys (MicroSurveys) executed on a rolling basis every 12 months, to update demographics such as:

- Address
- Employment Status
- Household Income
- Education Status
- Marital Status
- Household Size
- Number of Children in the Household

How do we scale and project the static panel data?

A key principle for Numerator around data quality is the importance of preserving the natural behavior of consumers. We believe that adjustments to panel data should be minimized and applied conservatively to preserve natural consumer behavior. Under that guiding principle, after the data is demographically weighted, we apply factors to project and scale the data to Total U.S. Levels.

Numerator data quality principles are designed to preserve the natural behavior of consumers.

Tenure Adjustment

In addition to the demographic/geographic weights applied to the static households, we also apply a slight tenure adjustment. We have identified predictable, consistent, moderate decreases in panelist participation across demographics and geographics over time (this is sometimes called panelist fatigue). Hence we have developed a proprietary methodology to adjust the weighting schema to account for the length of time a static household has been in the panel. This factor gives a slight, measured uplift to households who have been reporting for a longer period of time than those who are newer to the panel. That said, a panelist must always maintain a minimum of two trips per month for 12 consecutive months and meet the minimum retailer diversity requirement of 5 or more retailers shopped per year to remain a part of Numerator's Total Commerce Panel.

Projection Factor

The projection factor is actually a very straightforward factor based on the number of U.S. households vs. the number of raw (static) households. For example, if we have 150K households in our static panel and if there are 130 million households in the Total U.S., then each panel household would represent roughly 867 projected households – in other words, their data would be projected up (multiplied by) a factor of about 867.

Benchmark Factor

Being able to trend panel data is important to our clients, and panel data is commonly used in conjunction with other data sources like Point of Sale (POS) data. (Remember, panel data is best used as a diagnostic tool to understand consumer purchasing behavior driving overall sales changes in the marketplace vs to provide an absolute measurement of sales.)

As part of our Omni Calibration Process (which also includes the demographic weighting factors and projection factors), Numerator incorporates benchmark factors as a final refinement to our data. We implement proprietary methodology that leverages multiple benchmark data sources to scale the data to be more in-line or at scale with these benchmarks that represent the total market, and not just POS data. We use a variety of sources for calibration at the channel, retailer, category and brand levels in order to preserve natural consumer behavior - not force aligning to one narrow dataset. The data sources include publicly available and comprehensive data sources (such as census retail sales data, public filings (10-K, 10-Q), direct retailer relationships and other types of relevant partnerships (e.g., Location Data)) to determine the optimal factors. Once the data has had the projection and benchmark factors applied, the change in sales is then allocated to the other metrics inherent to panel data (like household penetration, purchase frequency, etc.).

Summary

A static is an essential element of a panel analytics process, as it ensures that the conclusions being drawn from the analyses are based on a full view of each household's actual purchasing behavior. For example, it helps ensure that a consumer has actually stopped buying a brand or category ("is lost") vs that they just stopped reporting or participating in the panel.

Numerator applies very "tight" or strict static requirements to our Total Commerce Panel data vs our competitors. This raises the quality of our panel data. For example, we apply a 12 out of 12 annual static

(panelists must be actively reporting in every month for a full year to be included in the data) whereas legacy panels (such as National Consumer Panel (NCP)) only apply a 10 out of 12 static requirement (this means that an NCP panelist can miss reporting almost 20% of the time and still be included in their analyses).

Applying strict standards rasies the quality of panel data.

With the Data Wave of Change in 2023, we are imposing even stricter static requirements on our Total Commerce Panel to ensure enhanced panel data quality. Instead of panelists providing a minimum of one receipt per month each month for 12 consecutive months, we are requiring a minimum of two (in fact, on average, our Total Commerce Static Panelists provide 30+ receipts per month). To ensure our static panelists are capturing their retailer diversity, we are requiring our Total Commerce Static Panelists to have provided receipts from at least 5 unique qualified FMCG or ecommerce retailers during the year (in fact, on average, our Total Commerce Static Panelist shops in 50+ unique banners in a year). Raising the bar on static requirements is only one of many steps we take to continue to provide the best, highest quality total commerce panel data in the industry.

NCP panelists qualify even if they miss 20% of consecutive months for reporting.

NCP panelists do not report online buying.

Despite using a more strict static requirement, Numerator's Total Commerce Panel delivers much higher static sample counts vs what our competitors can offer. For example, our annual (2 x12/12) static sample size is 150K households vs NCP's 65K households at a lower participation standard. This further validates the competitive advantage our modern approach to collecting panel data brings to the research industry. Panelists are more likely and willing to participate due to our digital and diverse data collection approach. This translates to delivering panel insights based on more buyers, more trips, more channels and retailers to our customers.

Our Numerator Total Commerce Panel is selected in a way that balances the "raw" (unprojected) panel to Total U.S. Census targets. Once the static panelists have been selected, we calibrate the data using benchmark

data sources. The calibration process leverages multiple data sources that represent all channels, not just what is captured by POS, to generate factors used to scale and weight total sales data. These factors include demographic factors as well as factors that scale the data to be more in-line with benchmark data.

Again due to our modern data collection approach, we have an advantage vs other panels (such as legacy panels) in getting households of all demographic/geographic characteristics to participate which gives us a closer "raw" match to Total U.S. Census. For example, households that are typically harder to recruit and maintain in a panel, such as Millennials, Ethnic, Low Income, and very High Income households are more likely to participate in our panel. This means that less adjustment needs to be applied to the static sample to demographically/geographically weight the panel data up to be representative of Total U.S. levels.

All panels are subject to a certain amount of "churn" (panelists leaving the panel). When a panelist churns out of the panel, we replace that household with a "like" household (in terms of demographic/geographic characteristics) to ensure we minimize disruption to the data and trends. We select these replacement households from our existing total panel (500K+ households) ensuring that any new households brought in have been actively reporting on a monthly basis every month for the past year. Once selected, we fully transcribe their back receipts for the past 12 months. Since we have such a robust amount of panelists "in the wings", we have an easier time replacing churned households vs legacy panels while still maintaining our advantage in "raw" alignment of the panel to Total U.S. Census. (It is also why we were able to expand the Static Panel from 100K to 150K households and provide back data for the 150K panel design over the past 4 years (2019 forward) immediately with the rollout.)

A healthy panel delivers a high level of static households over a long time period to ensure high quality panel analytics. Additionally, it is important to preserve the natural behavior of consumers when reporting or processing the panel data. Numerator's Total Commerce Panel delivers on these requirements to provide the best, most robust omnichannel view of consumer behavior available in the marketplace.


Numerator