

# MA State MRP Toplines



## STATE TOPLINES: MA

### Methodology: End of document

Percentages are modeled MRP estimates derived from the regional TCI survey. For more information on sampling procedures, statistical models and margins of error, please refer to the methodology section at the end of this document

approve \_ Do you approve or disapprove of the way Donald Trump is handling his job as President?

Response	Percent
Strongly approve	18%
Somewhat approve	17%
Somewhat disapprove	12%
Strongly disapprove	50%
Not sure	3%

rdwt \_ Generally speaking, would you say that things in this country are headed in the right direction or would you say that things are headed off on the wrong track?

Response	Percent
Right direction	31%
Wrong track	57%
Not sure	13%

TC17x1 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Repairing existing roads and bridges

Response	Percent
Not enough	53%
The right amount	28%
Too much	8%
Not sure	11%

TC17x2 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Increasing the availability and quality of public transportation options

Response	Percent
Not enough	33%
The right amount	40%
Too much	8%
Not sure	19%

TC17x3 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Drinking water and wastewater systems

Response	Percent
Not enough	32%
The right amount	44%
Too much	6%
Not sure	17%

TC17x4 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Energy efficiency programs for homeowners, businesses, and low- income houses

Response	Percent
Not enough	39%
The right amount	36%
Too much	8%
Not sure	18%

TCI7x5 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Airports

Response	Percent
Not enough	13%
The right amount	49%
Too much	13%
Not sure	25%

TCI7x6 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Reducing pollution that contributes to climate change

Response	Percent
Not enough	46%
The right amount	30%
Too much	6%
Not sure	17%

TCI7x7 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Building new roads and bridges

Response	Percent
Not enough	40%
The right amount	38%
Too much	7%
Not sure	15%

TCI7x8 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Affordable housing

Response	Percent
Not enough	49%
The right amount	29%
Too much	9%
Not sure	13%

TCI7x9 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Broadband internet access and affordability

Response	Percent
Not enough	35%
The right amount	36%
Too much	8%
Not sure	20%

TCI7x10 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Electric vehicle charging stations

Response	Percent
Not enough	28%
The right amount	33%
Too much	10%
Not sure	29%

TCI7x11 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Preparing for the effects of climate change

Response	Percent
Not enough	47%
The right amount	24%
Too much	12%
Not sure	17%

TCI7x12 \_ Do you think your state government is investing too much, not enough, or the right amount in each of the following? If you're not sure, just say so. - Renewable energy, such as wind and solar

Response	Percent
Not enough	43%
The right amount	30%
Too much	11%
Not sure	16%

TCI8x1 \_ Are each of the following a major factor, a minor factor, or not a factor at all in deciding what method of transportation you use? - Safety

Response	Percent
Major factor	67%
Minor factor	23%
Not a factor at all	10%

TCI8x2 \_ Are each of the following a major factor, a minor factor, or not a factor at all in deciding what method of transportation you use? - Cost

Response	Percent
Major factor	56%
Minor factor	32%
Not a factor at all	12%

TCI8x3 \_ Are each of the following a major factor, a minor factor, or not a factor at all in deciding what method of transportation you use? - Reliability

Response	Percent
Major factor	68%
Minor factor	23%
Not a factor at all	9%

TCI8x4 \_ Are each of the following a major factor, a minor factor, or not a factor at all in deciding what method of transportation you use? - Convenience

Response	Percent
Major factor	67%
Minor factor	24%
Not a factor at all	9%

TCI8x5 \_ Are each of the following a major factor, a minor factor, or not a factor at all in deciding what method of transportation you use? - Accessibility for individuals with disabilities

Response	Percent
Major factor	31%
Minor factor	32%
Not a factor at all	37%

TCI8x6 \_ Are each of the following a major factor, a minor factor, or not a factor at all in deciding what method of transportation you use? - Impact on the environment

Response	Percent
Major factor	31%
Minor factor	46%
Not a factor at all	23%

TCI8x7 \_ Are each of the following a major factor, a minor factor, or not a factor at all in deciding what method of transportation you use? - Speed

Response	Percent
Major factor	38%
Minor factor	42%
Not a factor at all	20%

TCI8x8 \_ Are each of the following a major factor, a minor factor, or not a factor at all in deciding what method of transportation you use? - Health

Response	Percent
Major factor	55%
Minor factor	26%
Not a factor at all	19%

TCI9 \_ Do you think your state government is adequately prepared to deal with the impacts of extreme weather/storms, including flooding, heavy rainfall, and heat waves, on transportation infrastructure?

Response	Percent
Not prepared	39%
Not sure	23%
Prepared	38%

TCI10x1 \_ When it comes to investing in the transportation infrastructure in your local area, how important are each of the following objectives? - Increasing the number of clean public transportation options, such as electric busses and commuter rail, to reduce carbon pollution that contributes to climate change

Response	Percent
Very important	44%
Somewhat important	42%
Not too important	9%
Not at all important	5%

TCI10x2 \_ When it comes to investing in the transportation infrastructure in your local area, how important are each of the following objectives? - Increasing the quality, affordability, and access/convenience of public transportation

Response	Percent
Very important	50%
Somewhat important	38%
Not too important	8%
Not at all important	3%

TCI10x3 \_ When it comes to investing in the transportation infrastructure in your local area, how important are each of the following objectives? - Reducing harmful pollution that lowers air quality and contributes to asthma and lung disease

Response	Percent
Very important	57%
Somewhat important	31%
Not too important	8%
Not at all important	4%

TCI10x4 \_ When it comes to investing in the transportation infrastructure in your local area, how important are each of the following objectives? - Ensuring low-income communities and communities of color have increased access to public transportation

Response	Percent
Very important	50%
Somewhat important	38%
Not too important	8%
Not at all important	4%

TCI10x5 \_ When it comes to investing in the transportation infrastructure in your local area, how important are each of the following objectives? - Ensuring essential workers, such as doctors, nurses, and teachers, can get to work safely and on time to perform their duties

Response	Percent
Very important	67%
Somewhat important	27%
Not too important	4%
Not at all important	1%

TCI10x6 \_ When it comes to investing in the transportation infrastructure in your local area, how important are each of the following objectives? - Reducing traffic congestion

Response	Percent
Very important	50%
Somewhat important	39%
Not too important	8%
Not at all important	3%

TCI10x7 \_ When it comes to investing in the transportation infrastructure in your local area, how important are each of the following objectives? - Designating more walking routes / bike lanes

Response	Percent
Very important	29%
Somewhat important	43%
Not too important	21%
Not at all important	7%

TCI11 \_ How important is it to you for your state to reduce carbon pollution at the local level?

Response	Percent
Very important	48%
Somewhat important	37%
Not too important	11%
Not at all important	5%

TCI12 \_ Do you approve or disapprove of the job President Donald Trump is doing in handling the coronavirus pandemic?

Response	Percent
Strongly approve	19%
Somewhat approve	18%
Somewhat disapprove	11%
Strongly disapprove	49%
Not sure	2%

TCI13 \_ Do you approve or disapprove of the job your state governor is doing in handling the coronavirus pandemic?

Response	Percent
Strongly approve	33%
Somewhat approve	41%
Somewhat disapprove	14%
Strongly disapprove	9%
Not sure	3%

TCI14 \_ As you may know, in response to the coronavirus pandemic, many governors have formed regional coalitions to address public health concerns and work together to rebuild their economies. Would you support or oppose your governor working with other governors in your region to address other issues, such as expanding transportation?

Response	Percent
Strongly support	47%
Somewhat support	37%
Somewhat oppose	6%
Strongly oppose	3%
Not sure	8%

TCI15 \_ Do you agree or disagree with the following statement: If the federal government fails to reduce the pollution that causes climate change, my state government should take action to reduce pollution.

Response	Percent
Strongly agree	39%
Somewhat agree	35%
Somewhat disagree	10%
Strongly disagree	7%
Not sure	8%

TCI16 \_ Do you agree or disagree with the following statement: When considering investments in modernizing and upgrading transportation, my state government should prioritize communities of color, including Black, Latino, Asian, and Native American communities, who lack sufficient access to transportation and have historically been more negatively impacted by vehicle pollution.

Response	Percent
Strongly agree	30%
Somewhat agree	35%
Somewhat disagree	13%
Strongly disagree	8%
Not sure	13%

TCI17 \_ As you may or may not know, 11 Northeast and Mid-Atlantic states and the District of Columbia have joined together in a regional transportation agreement, called the Transportation and Climate Initiative (TCI). Under TCI, states will cap carbon pollution from the transportation sector and require gasoline companies to pay for the carbon pollution produced by the fuel they sell by purchasing annual allowances. The proceeds generated by this plan would then be reinvested in cleaner, more efficient, and more accessible transportation options. Do you support or oppose your state participating in the Transportation and Climate Initiative (TCI)?

Response	Percent
Strongly support	40%
Somewhat support	32%
Somewhat oppose	9%
Strongly oppose	7%
Not sure	12%

TCI18 \_ Which of the following statements comes closest to your view on the Transportation and Climate Initiative (TCI) and recovery from the coronavirus pandemic, even if neither is exactly right?

Response	Percent
My state SHOULD join TCI as part of the recovery from the coronavirus pandemic. TCI will help jumpstart my states economy and create new, good-paying jobs, while reducing air pollution.	72%
My state should NOT join TCI as part of the recovery from the coronavirus pandemic. TCI will be an economic burden on consumers and families in my state and will increase costs on basic needs like ga	28%

TCI19x1 - Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Adding or upgrading sidewalks to improve walkability and public health

Response	Percent
Strongly support	43%
Somewhat support	38%
Somewhat oppose	8%
Strongly oppose	3%
Not sure	7%

TCI19x2 - Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Increasing access to bikes, scooters, and other shared mobility options

Response	Percent
Strongly support	29%
Somewhat support	38%
Somewhat oppose	14%
Strongly oppose	6%
Not sure	12%

TCI19x3 - Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Adding bike lanes to existing roads and bridges

Response	Percent
Strongly support	26%
Somewhat support	39%
Somewhat oppose	15%
Strongly oppose	9%
Not sure	11%

TCI19x4 - Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Providing consumer rebates or incentives to purchase cleaner-fuel vehicles, like electric vehicles

Response	Percent
Strongly support	38%
Somewhat support	36%
Somewhat oppose	11%
Strongly oppose	5%
Not sure	10%

TCI19x5 - Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Building and expanding charging infrastructure for electric vehicles

Response	Percent
Strongly support	29%
Somewhat support	39%
Somewhat oppose	14%
Strongly oppose	6%
Not sure	13%

TCI19x6 - Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Repairing existing roads and bridges, such as fixing bridges that are in poor condition

Response	Percent
Strongly support	57%
Somewhat support	29%
Somewhat oppose	5%
Strongly oppose	2%
Not sure	6%

TCI19x7 - Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Investing in existing roads and bridges to make them more resilient to the impacts of climate change, such as extreme weather and flooding

Response	Percent
Strongly support	49%
Somewhat support	34%
Somewhat oppose	7%
Strongly oppose	2%
Not sure	8%

TCI19x8 - Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Adding new bus routes and train lines to reach communities, including in rural and suburban locations, that don't currently have access to public transportation

Response	Percent
Strongly support	39%
Somewhat support	37%
Somewhat oppose	10%
Strongly oppose	4%
Not sure	10%

TCI19x9 – Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Increasing the availability of paratransit, or services that supplement mass transit by providing individualized rides without fixed routes or timetables

Response	Percent
Strongly support	24%
Somewhat support	40%
Somewhat oppose	12%
Strongly oppose	4%
Not sure	20%

TCI19x10 – Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Expanding high speed communications and internet, especially to rural communities and those who can least afford this essential service

Response	Percent
Strongly support	45%
Somewhat support	36%
Somewhat oppose	7%
Strongly oppose	3%
Not sure	9%

TCI19x11 – Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Increasing the frequency of buses and trains along existing routes

Response	Percent
Strongly support	29%
Somewhat support	40%
Somewhat oppose	14%
Strongly oppose	4%
Not sure	13%

TCI19x12 – Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Reducing the pollution emitted in shipping ports by installing zero-emission electric equipment

Response	Percent
Strongly support	37%
Somewhat support	35%
Somewhat oppose	11%
Strongly oppose	5%
Not sure	13%

TCI19x13 – Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Improving reliability of public transit (e.g., buses, trains, and subways)

Response	Percent
Strongly support	46%
Somewhat support	37%
Somewhat oppose	7%
Strongly oppose	3%
Not sure	7%

TCI19x14 – Do you support or oppose directing proceeds from the Transportation and Climate Initiative (TCI) to each of the following infrastructure projects in your state? - Modernizing and improving public transit (e.g., replacing older buses with new electric buses, upgrading old subway cars and trains, adding solar to bus stops, upgrading transit stations)

Response	Percent
Strongly support	46%
Somewhat support	35%
Somewhat oppose	7%
Strongly oppose	3%
Not sure	9%

TCI20x1 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - Health professionals, such as doctors, nurses, or first responders

Response	Percent
A lot	39%
Some	41%
Not much	13%
Not at all	7%

TCI20x2 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - Local government officials

Response	Percent
A lot	16%
Some	54%
Not much	20%
Not at all	10%

TCI20x3 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - Business leaders

Response	Percent
A lot	9%
Some	43%
Not much	36%
Not at all	12%

TCI20x4 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - My state's governor

Response	Percent
A lot	25%
Some	49%
Not much	16%
Not at all	10%

TCI20x5 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - President Elect Joe Biden

Response	Percent
A lot	13%
Some	45%
Not much	24%
Not at all	17%

TCI20x6 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - Climate scientists

Response	Percent
A lot	45%
Some	35%
Not much	11%
Not at all	8%

TCI20x7 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - Oil and natural gas companies

Response	Percent
A lot	11%
Some	32%
Not much	38%
Not at all	20%

TCI20x8 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - Renewable energy companies

Response	Percent
A lot	24%
Some	48%
Not much	19%
Not at all	8%

TCI20x9 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - Environmental organizations

Response	Percent
A lot	34%
Some	43%
Not much	15%
Not at all	9%

TCI20x10 – How much, if at all, do you trust the following people and groups to provide information about the Transportation and Climate Initiative (TCI)? - TV weather forecasters/meteorologists

Response	Percent
A lot	18%
Some	47%
Not much	25%
Not at all	10%

# TCI Poll Methodology

**Poll number:** pr2025

**Interview Dates:** November 9-15, 2020

**Sample Population:** 3818 registered voters across TCI states (CT, DC, DE, ME, MD, MA, NJ, NY, PA, RI, VT, VA).

**Sample Selection:** Scientific online poll - stratified sample of panel respondents.

**Weighting Parameters:** The sample was weighted based on the U.S. Census Bureau's Voting and Registration Supplement to the Current Population Survey for registered voters across TCI states based on age, gender, race, educational attainment, state proportions, and Hispanic ethnicity.

This topline provides weighted percentages, as well as the unweighted N-size for the total sample. Due to the effects of weighting and rounding, figures may or may not add up to 100%. The standard deviation of the weights was: 0.1904898. The maximum weight was: 1.6681629. The minimum weight was: 0.4801848. 95% of the weights were between 0.7037685, 1.3959446.

**Margin of Error:** The 95% credibility interval for this survey is +/- 1.6%, which includes the square root of the design effect (DEFT): 1.0179768.

## State MRP Methodology

Climate Nexus utilizes MRP to develop state and local public opinion estimates from national survey data.

Multilevel modeling and poststratification (MRP) is an analytical methodology designed to provide accurate, detailed estimates of public opinions for small geographic areas. The method emerged in recent decades from political science and has been widely shown to produce estimates more accurate than any competing approaches. An MRP analysis involves two stages. First, individual survey responses are modeled as a function of demographics, location, and geographic covariates (the "multilevel regression model"). In this way, unique geographic variability from local residents (while controlling for their demographic characteristics) can be captured and used to estimate opinions for nearby places. The second step is poststratification, where the fitted estimates for each demographic-geographic respondent type are weighted by their actual (census-based) population counts for a given area. Percentages of respondents with a particular preference can then be estimated for every state, county, or other geographic unit.

MRP has been referred to as the "gold standard" for estimating sub-national opinion (Selb and Munzert 2011, 456), but in some contexts, dis-aggregation may be preferred when sample sizes are large enough and close to random. In particular, studies aimed at assessing causal effects on public opinion should generally use disaggregation rather than a model-based method such as MRP (Caughey and Warshaw, 2019).

Nexus employs an advanced version of MRP, called multilevel regression and synthetic post-stratification (MRSP)<sup>1</sup> to calculate estimates. This approach has been shown to increase the prediction and precision of sub-national public opinion estimation beyond traditional MRP by using synthetic joint distributions that are created on the marginal distributions. In comparison, traditional MRP utilizes "true" joint distributions, or stratas, such as the interaction of age + gender + race, and is therefore limited to few variables. As an alternative, we use a technique called multidimensional iterative proportional fitting (mipfp) to develop cell proportions for each demographic type, which is an exercise in spatial micro-simulation.

By sidestepping the stringent data requirements of traditional MRP, we are able to develop dynamic and robust predictive models that include more predictive variables to better assess public opinion within small geographic boundaries. Once compiled, we use a generalized mixed effects regression model to develop the predicted estimates for each population strata, and then we post stratify to take the weighted sum across all cells to make inferences about each state.

We use the ~3800 person TCI survey data to fit a generalized mixed effects model:

$$y = \Pr(y_i = 1) = \text{logit}^{-1}(a_{j[i]} + \phi x_i + e_i)$$

where

$$\text{logit}^{-1}(a) = \frac{\exp(a)}{\exp(a) + 1}$$

where distributions of the random effect covariates (individual-level predictors  $y \sim (1|a) + (1|b) + \dots (1|n)$ ) are drawn with mean zero and estimated variance:

$$\begin{aligned} a_j^{\text{race}} &\sim N(0, a_{\text{race}}^2), f_{orj} = 1, \dots, 3 \\ a_l^{\text{education}} &\sim N(0, a_{\text{education}}^2), f_{orl} = 1, \dots, 4 \\ a_m^{\text{gender}} &\sim N(0, a_{\text{gender}}^2), f_{orm} = 1, \dots, 2 \\ a_s^{\text{state+DC}} &\sim N(0, a_{\text{state+DC}}^2), f_{ords} = 1, \dots, 51 \\ a_h^{\text{Hispanic}} &\sim N(0, a_{\text{Hispanic}}^2), f_{orh} = 1, \dots, 2 \\ a_{\text{Censusreg}} &\sim N(0, a_{\text{Censusreg}}^2), f_{orkl} = 1, \dots, 9 \end{aligned}$$

In the model, each individual's response is a function of their individual level demographic variables, state/congressional district grouping variables, and interactions. The individual-level covariates are specified as random effects and have varying intercepts. Group-level predictors (such as election returns, percent of same sex households in a district, total CO2 emissions, and the percent that drive alone in a particular state - all covariates that are useful in estimating questions related to climate change) do not have varying intercepts or slopes. Covariates are chosen to maximize the model's "r-squared", or predictive power in the sense that they are useful in understanding the variance we witness in the outcome variable.

Each stratum or "type of individual" in the state is estimated using multidimensional iterative proportional fitting (mipfp), which calculates the synthetic joint distribution derived from the marginal distributions of the individual level covariates obtained from the Census (gender, race, Hispanic ethnicity, and educational attainment) for each state in the state resulting in:

$$N_{\text{stratsByState}} = 2(\text{gender}) * 3(\text{race}) * 4(\text{education}) * 2(\text{Hispanic}) = 48$$

## MRP Model Specs

For individual i, with the following indexes for each demographic variable in the model, the state model, can typically be defined:

$$y = \Pr(y_i = 1) = \text{logit}^{-1}(\phi_0 + a_{j[i]}^{\text{race}} + a_{l[i]}^{\text{education}} + a_{s[i]}^{\text{state+DC}} + a_{r[i]}^{\text{region}} + a_{m[i]}^{\text{gender}} + a_{h[i]}^{\text{Hispanic}} + a_{\text{election}_{2016}} + a_{\text{TotalCO2}} + a_{\text{PercentSameSexHH}} + a_{\text{pctDriveAlone}}. \text{ scl})$$

where non random effects covariates can be standardized.

The prediction for each strata, that is, the prediction for each "type of person" is then weighted by the population frequency of the cell (poststratification).

## State Model & Prediction Differences (IF APPLICABLE)

Due to the fact that the state and CD models have different random effects parameters and geographic outcome variables, it is likely that we find different in-group estimates that do not allow for comparison across the MRsP models. As a result of the varying random effects parameters (in-group variation that allows shifts in the slope or intercept of a variable), a state's overall MRsP estimate may vary from the average estimate across all CD MRsP estimates in a given state. This is evident in at-large district states where the state MRsP prediction outcome does not equal the CD-level prediction.

While we do expect at-large district estimates from the CD model to fall within the average margin of error of the state model (see below for section on margins of error), to minimize confusion, all at-large district estimates will equal the state model prediction.

## MRP Confidence Intervals / Margins of Error

To capture model uncertainty in predictions at the 95% confidence level from multilevel models (merMod objects (<https://www.rdocumentation.org/packages/lme4/versions/1.0-4/topics/merMod-class>)), we utilize `merTools::predictInterval()`. By drawing a sampling distribution for the random and the fixed effects and then estimating the fitted value across that distribution, it is possible to generate a prediction interval for fitted values that includes all variation in the model except for variation in the covariance parameters. This is a much faster alternative than bootstrapping for models fit to medium to large data sets.

To estimate the overall margin of error (ME) for each geographic unit (utilizing a `draw::compute` approach), where the function `g(x)` yields an MRP estimate for a given state, we iterate the `merTools::predictInterval()` process 999 times for each survey question then calculate the confidence interval at the 95% confidence level for each subgroup within a state. The margin of error for each subgroup can be calculated by subtracting the lower bound of the confidence interval from the upper bound, and dividing by two. To calculate the state's overall margin of error for a given survey question we multiply each subgroup's margin of error by the n-size (or percent of the population) of that group and divide it by the sum of those weighted margins of error (the weighted mean by the proportion of that subgroup):

$$x = \frac{\sum_{i=1}^n (x_i * w_i)}{\sum_{i=1}^n w_i}$$

The average range of the MoE across modeled answer options are between:

- State level estimate MoE: +/- 6-9%

Because each estimate for a specific answer choice in the survey is a modeled outcome variable with its own corresponding confidence interval, questions may or may not add up to 100%. If they do not, we normalize results to help with interpretation.

## Sub-national MRP crosstab models for Party Identification

To develop cross tabs for particular a demographic group (i.e. PartyID), we first calculate the proportion of that demographic type in a given geographic region using `mipfp`, we then filter for the specific subgroup (different levels within categories such as gender, educational attainment, race, etc.) and develop new post-stratification weights by taking the cell weighted proportion and dividing it by the sum of the weights of that subgroup. In the final step, we sum the post-stratified predicted probabilities for each subgroup.

If a demographic type does not have Census proportions (such as proportions of self identified Republicans in a given state, which isn't tracked by the Census) we first develop an MRsP model to calculate the proportion of individuals that fit that demographic type, much like predicting any other survey question or outcome variable. We then use those proportions as given population percentages in a given state and can then filter, divide the sum of the weights of that variable, post-stratify, and sum across each cell.

We follow the process below to estimate opinions of a given subgroup.

$$m = \text{poststratificationweights of sub} - \text{population}_k$$

$$y = \Pr(y_i = 1) = \text{logit}^{-1}(a_{j[i]} + \phi x_i + e_i)$$

$$\text{logit}^{-1} = \frac{\exp(a)}{1 + \exp(a)}$$

$$\text{weightedStatePred} = \sum_{k=1}^n \text{logit}^{-1}(a_{j[i]} + \phi x_i + e_i) * \frac{m_i}{\sum m}$$

For this poll we included modeled partyID proportions for each state, included it into the MRsP model resulting in 144 nested subgroups that we predict on by state:

$$N_{\text{stratsByState}} = 2(\text{gender}) * 3(\text{race}) * 4(\text{education}) * 2(\text{Hispanic}) * 3(\text{PartyID}) = 144$$

The full partisan state model can be defined:

$$y = \Pr(y_i = 1) = \text{logit}^{-1}(\phi_0 + a_{j[i]}^{\text{race}} + a_{l[i]}^{\text{education}} + a_{s[i]}^{\text{state+DC}} + a_{r[i]}^{\text{region}} + a_{\text{partyID}_3}^{\text{partyID}_3} + a_{m[i]}^{\text{gender}} + a_{h[i]}^{\text{Hispanic}} + a_{\text{election}_{2016}} + a_{\text{TotalCO2}} + a_{\text{PercentSameSexHH}} + a_{\text{pctDriveAlone}}. \text{ scl})$$