Pre-Analysis Plan for *"Public Attribution of Responsibilities in Decentralized Autocracies"*

Georgiy Syunyaev

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Contents

1   Introduction

Decentralization can be potentially beneficial for welfare and democracy for a variety of reasons: It can ensure more efficient public goods provision by employing local knowledge, encouraging policy experimentation, creating more checks and balances on the local government, and nurturing civic culture among citizens (Oates, 1972; Weingast, 1995; Tsebelis, 2002; Treisman, 2007; Faguet, 2014). Most of these arguments presume that the government, which designs and implements decentralization policy, has incentives to improve social welfare or economic performance. Unlike many accounts of democratic regimes, this assumption is often absent in the literature on nondemocratic regimes, since autocrats often aim to maximize their political power to extract rents from society, maintain their ruling coalition or suppress discontent (see Gehlbach, Sonin and Svolik, 2016, for the review). Moreover, government's incentives to improve overall economic performance is likely to be violated in illiberal democracies as well, even though the main threat to survival of the government in such regimes comes from the electoral process rather than protests and coups.

Movements toward political and fiscal centralization across non-democracies suggest that autocrats might indeed be interested in and capable of keeping all political power at the federal level (Reuter and Beazer, 2016; Dickovick, 2011; Malesky, Nguyen and Tran, 2014). Why, then, do so many clearly autocratic regimes, like Russia, Vietnam, Venezuela or China pursue ostensibly antithetical policies of decentralization? In the dissertation project I argue that the decentralization decision in autocracies is at least partly driven by the public attribution of responsibilities between multiple levels of government, and the capacity of the government to affect such attribution through framing. The ability of the government to unilaterally choose the level of decentralization, as well as to control its public framing, can severely undermine accountability of government by preventing citizens from correctly punishing and rewarding politicians for economic performance (Ferejohn, 1986; Fiorina, 1981; Healy and Malhotra, 2013). Both of those features are more likely to be present in authoritarian settings (Egorov, Guriev and Sonin, 2009; Gandhi and Lust-Okar, 2009;

McMillan and Zoido, 2004; Faguet, 2014)—specifically in Russia, location of this study (Crabtree, Fariss and Kern, 2015; Reuter and Robertson, 2012; Turovsky and Gaivoronsky, 2017; Sirotkina and Zavadskaa, 2016; Rozenas and Stukal, 2017).

This project seeks to empirically assess ability and effectiveness of public framing of responsibility: Manipulation of citizens perception of responsibility without shifting its *de jure* allocation. I specifically focus on the ability of two levels of government (regional and federal) to shift citizens' attribution of blame or credit for different public policy outcomes using captured media (or propaganda). Media framing, often studied in democratic environments (DellaVigna and Kaplan, 2006; Enikolopov, Petrova and Zhuravskaya, 2011; Strömberg, 2015), should play especially important role in weak democratic and authoritarian states where media capture by political interests is widespread. At the same time recent studies in the Russian context argue that propaganda in countries where federal government has strong grip on media and information, might have limited effect on citizen attitudes (Rosenfeld, 2018; Truex, 2016). This disparity between theoretical use of propaganda and the its empirically estimated effects creates a puzzle: Why does state captured media employ strategies that have limited overall effect on public perceptions? In this study I aim to take a closer look at the effects propaganda coverage can have on citizen's attitudes.

To do so I propose to conduct a 3-arm survey experiment in four Siberian and Far-East regions of Russia: Novosibirsk, Irkutsk and Kemerovo oblasts and Krasnoyarskiy Krai. All four of those regions were affected by the widespread natural forest fires this summer to a different extent: While the actual forest fires were concentrated in Irkutsk oblast' and Krasnoyarskiy krai, all four regions (including their capital cities) were covered by life-threatening smoke from the fires due to the wind currents. This creates an exogenous difference in the extent to which the responsibility for extinguishing the forest fires and their consequences (smoke and smell) can be attributed to the sub-national (regional) government across four regions.

I propose to use the media coverage that attributes responsibility for preventing and combating natural disasters, such as forest fires, from the local branches of nationwide state-owned TV Channel *Rossia-1* in all of four region to estimate to which extent the blame and credit for natural disaster management can be framed through state captured media. To assess separately effects of responsibility framing on different types of policies I plan to introduce 2 separate treatments: While the news story shown to *Forest Fires* treatment group will cover the blame shifting for natural disaster prevention towards regional government, the news story shown to *Road Construction* treatment group will cover credit claiming by regional government for local road construction. To improve statistical power to estimate heterogenous treatment effects each of the treatment groups in the experiment will partly serve as a placebo control for the estimation of the effects of the other treatment group on a battery of outcomes

The primary goal of the project is to answer (1) Whether the framing of responsibilities affects citizens' attribution of blame for public policy outcomes to different levels of government in federal system, (2) Whether the media exposure, citizen sophistication and prior knowledge of the informa-

tion covered in the report mediate the effects of responsibility framing, (3) Whether the visibility and prior experience with policy covered mediates the effects of responsibility framing.

2 Design of the intervention

The survey experiment will be conducted online on a sample of 4000 respondents residing in one of the four regions of Russia, Novosibirsk, Irkutsk and Kemerovo oblasts and Krasnoyarskiy Krai.[1] In each region I aim to enroll around 1000 respondents in each region. The choice of regions for the study is primarily driven by (a) the overlap with the location of the initial study conducted last year in Novosibirsk region, (b) the fact that all for regions in this study were affected by large scale natural forest fires that happened in Siberia this summer, and (c) two out of four regions have at least some level of government (either municipal in Novosibirsk, or regional in Irkutsk) controlled by the Communist Party member, that in local elections, especially in Siberia, openly opposes rulling party, United Russia.[2]

The treatment media reports will include one video excerpt per treatment per region. In each region the media reports are chosen from the previously aired news coverage of the local branch of *Rossia-1* TV channel owned directly by the federal government. The main news broadcast on *Rossia-1* TV channel, *Vesti*, airs at least 3 times every day and includes national economic, political and cultural news as well as coverage of local events specific to the region, where the viewer resides. In each of the four regions in the study *Rossia-1* was in top-10 most cited local media outlets in 2018 according to the media research company Medialogia.[3] In addition, *Vesti* consistently ranks among the top viewed TV broadcasts in Russia according to Medialogia reports.

For the intervention I plan to use news reports on three topics in each region: (*D*) Responsibility attribution for preventing and combating natural forest fires (as a part of overall natural disaster relief policy); (*R*) Responsibility attribution for road construction and repairs (as a part of overall transport infrastructure development); and (*P*) Coverage of the birthday of prominent Russian actor (as a placebo news report unrelated to domestic policy or government performance). For the forest fires coverage I will use the coverage from *Vesti* broadcast on visit of Prime Minister of Russia, Dmitriy Medvedev, to one of the study regions (Krasnoyarsk), where he states that primary responsibility for forest fires is on regional and municipal governments rather than on national government. For road construction/repairs, the selected intervention video again comes from *Vesti* broadcast and covers the general assembly of all heads of regions in Russia where Prime Minister, Dmitriy Medvedev, again states that primary responsibility for poor quality of roads is on regional and municipal governments rather than on national government. Finally, the placebo video used in the study also comes from *Vesti* broadcast but unlike *D* and *R* videos will cover event unrelated to policy or government performance: Birthday of prominent Russian actor. All reports

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[1]Hereafter I refer to the study regions as Novosibirsk, Irkutsk, Kemerovo and Krasnoyarsk regions respectively.

[2]United Russia members hold the rest of the municipal and regional executive offices.

[3]Rankings and methodology are detailed here.

used in the study share the same length (around 1 minute) and quality (come from the same news broadcast) to assure symmetricity of presentation of information and only vary the contents.

The proposed intervention aims to induce shock to beliefs about allocation of responsibility for specific policy (infrastructure or natural disaster relief) between different levels of government without strongly affecting beliefs about policy performance or media bias. While this is a matter of empirical verification, several substantive factors make it plausible that proposed treatment video reports might primarily affect beliefs about responsibility allocation:

1. In both treatment video reports the statement about responsibility allocation is delivered by Prime Minister of Russia, as opposed to narrator, and are strongly highlighted as federal government position;

2. Both policies covered in treatment videos are highly visible with forest fires being one of the most discussed issues of the year in Russian media.[4] This in turn implies that respondents in the study are likely to have strong prior beliefs about the policy outcomes[5];

3. Both treatment video reports feature blame-shifting by the federal government, and mention problems of respective policies in general. This, combined with (2) above, implies that respondents are unlikely to find the information on policy performance contained in the treatment reports novel;

4. The media outlet, *Rossia-1* used in the study is one of the most popular TV channels in Russia[6], and majority of respondent in the study are expected to have prior experience and fairly stable beliefs about the bias of the news coverage by *Rossia-1* channel prior to viewership of the treatment video reports.

Exact wording and example screenshots from the news reports used in ths study can be found in the Experimental news reports section in the Appendix.

The data collection will be conducted in partnership with OMI survey company (Russian survey platform similar to Amazon Mechanical Turk) that primarily does marketing research for private enterprises and has a large pool of adult respondents (~900 000) across Russia enrolled for regular surveying by OMI on per survey compensation. While generally not representative of overall population of Russia or any of the regional populations, in four regions where the study will be conducted OMI pool has respondents in all main income, age and education brackets. That said, the sample in each region will be skewed towards urban, middle aged (25-45 y.o.) and more wealthy and educated population. Given the restriction on the sample size by region of OMI pool of respondents, I will only require that respondents in the study to be residents of one of the four study regions and to be 18 or more y.o.

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[4] According to surveys by both state-owned Public Opinion Fund (link), and independent Levada Center (link).

[5] This assumption is also empirically testable, given that survey instrument includes several pre-treatment questions aiming to measure prior exposure and knowledge of issues in both policies.

[6] According to the study of the media consumption conducted by Levada Center (link), one of the prominent independent survey agencies in Russia.

The survey data will be collected via EnjoySurvey online platform, that is designed by OMI partners and allows for simple random assignment, online surveying either on mobile or laptops/PCs, showing of video materials and multiple advanced visual implementation of questions[7]

Respondents who agreed to participate in the survey (click on link in email invitation) will be presented with the information sheet script prior to the survey and will be asked if they agree to participate in the study. Information sheet can be found in the Appendix section Information Sheet.
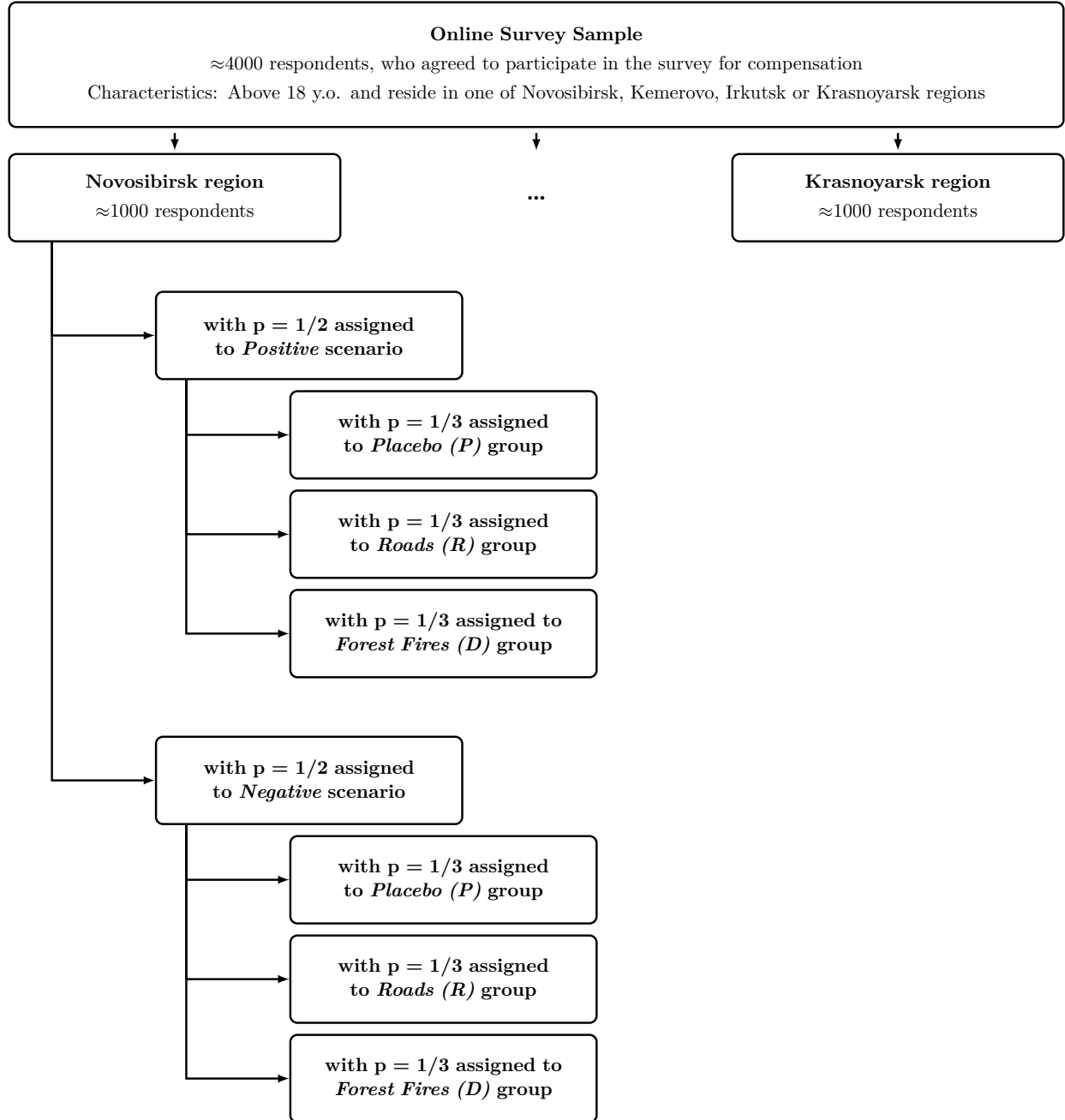
In addition, prior to assignment to main experimental condition, each respondent will be randomly assigned to receive one of the two hypothetical scenarios for evaluation of responsibility for policy not related to natural disaster relief or infrastructure. The simple random assignment to receive either negative or positive scenario to evaluate will be independent of the assignment to watch one of the main experimental video reports. Both scenarios will cover the same policy, public health care, and will feature both national and regional government. The main difference between scenarios will be in the outcome of policy: One of the scenarios will the present case where due to insufficient funding public hospitals in the region were not renovated, while the other will present the case where the hospitals were renovated. The aim of this additional survey experiment is to measure potential differences in terms of assignment of blame and credit for the same policy among study participants.

The resulting structure of sample and experimental assignment is shown in the Figure 1.

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[7]It allows to include pictures in the question answer options (important for politician recognition questions), wording of questions to be conditional on previous answers (important for questions about TV channels specific to particular region), drag-and-drop boxes with images for categorical questions with different objects being evaluated (important for veiwership questions by media outlet), etc.

Figure 1: Structure of the sample enrolled for the Online survey experiment and split into blocks by region. Each block includes respondents assigned to each of the treatment conditions with equal probability (simple random assignment).

Online Survey Sample
≈4000 respondents, who agreed to participate in the survey for compensation
Characteristics: Above 18 y.o. and reside in one of Novosibirsk, Kemerovo, Irkutsk or Krasnoyarsk regions

Novosibirsk region
≈1000 respondents

...

Krasnoyarsk region
≈1000 respondents

with p = 1/2 assigned
to *Positive* scenario

with p = 1/3 assigned
to *Placebo (P)* group

with p = 1/3 assigned
to *Roads (R)* group

with p = 1/3 assigned to
Forest Fires (D) group

with p = 1/2 assigned
to *Negative* scenario

with p = 1/3 assigned
to *Placebo (P)* group

with p = 1/3 assigned
to *Roads (R)* group

with p = 1/3 assigned to
Forest Fires (D) group

3 Theoretical predictions

3.1 Simple Bayesian framework

In this project I rely on rational Bayesian updating as basic framework for generating predictions about the treatment effects. For simplicity I assume that there are two levels of government, central and local, one potentially biased media outlet and a representative citizen who updates beliefs about allocation of responsibility between two levels of government upon observing media report. In the rest of this section I describe the updating of beliefs by representative citizen about primary and secondary outcome upon observing news reports from potentially biased media.

3.1.1 Primary outcomes

I assume that citizen updates the following beliefs about primary outcomes related to contents of report simultaneously according to the Bayes rule:

1. Beliefs about **quality of (R)oad infrastructure** and **quality of natural (D)isaster prevention policy**, denoted θ_R and θ_D respectively,
2. **Responsibility attribution between two levels of government**, called (L)ocal and (C)entral hereafter, for the two policies, denoted by $\rho_{R,j}$ and $\rho_{D,j}$ respectively with $j \in \{L, C\}$,
3. Belief about **strength of media bias in favor of central government**, given by $\beta \equiv \beta_C$.[8]

I assume that $\forall k \in \{R, D\} : \theta_k \in \{0, 1\}$, i.e. that the policy outcome is either *"good"* (1) or *"bad"* (0); $\forall k \in \{R, D\}, \forall j \in \{L, C\} : \rho_{k,j} \in {0, 1}$, i.e. policy responsibility can be attributed to any of the two levels of government considered in the model;[9] $\beta \in [0, 1]$, i.e. media outlet can be fully independent ($\beta = 0$), or biased in favor of the central government ($\beta > 0$). In addition, I assume that $\forall k : \rho_k \equiv \rho_{k,L} \equiv 1 - \rho_{k,F}$, which essentially implies that all responsibility for any policy is distributed between different levels of government.[10]

To resemble the study design, I assume that given that media outlet decided to report on particular policy, the set of possible reports consists of responsibility for policy outcome being attributed to one of the two levels of government, $\forall k \in \{R, D\} : m_k \in \{L, C\}$.[11] The overall reporting strategy

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[8]Richer model can assume that the media might be biased in favor of the local government as well, i.e. local government can try to deflect blame and claim credit against the federal government. Introducing this assumption preserves the theoretical predictions below, and given that the news outlet used in this study is universally known to be owned by federal government, for simplicity I assume that $\beta_L = 0$.

[9]This assumption is due to both policies used in the experimental news reports being domestic public policies that are fully in the perview of the domestic governments and unlike foreign affairs, are harder to attribute to political actors outside the government.

[10]This assumption *is likely to be violated* for policy outcomes that can directly be attributed to non-state actors, such as foreign governments, but *is plausible* for the domestic public policy outcomes considered in this study, natural disaster prevention and infrastructure.

[11]It is assumed that placebo news report that does not cover any public policy or related allocation of responsibility has no effect on evaluation of any of the policy related beliefs (i.e. $\forall k \in \{R, D\} : \theta_k, \rho_k, \beta$). This assumption is motivated by the fact that space of possible topics for media coverage is large enough, that absence of coverage on particular public policy does not allow citizens to infer any substantial information about policy related outcomes.

of the media outlet, given that it decides to report on policy k, is given by:

$$\Pr(m_k = L \mid \theta_k, \rho_k, \beta) \equiv$$

$$\underbrace{(1-\theta_k)\rho_k}_{\substack{\text{blame received by}\\\text{local government}}} + \underbrace{\theta_k\rho_k}_{\substack{\text{credit claimed by}\\\text{local government}}} + \underbrace{\beta(1-\theta_k)(1-\rho_k)}_{\substack{\text{blame avoided by}\\\text{central government}}} - \underbrace{\beta\theta_k\rho_k}_{\substack{\text{credit lost to}\\\text{central government}}}. \tag{1}$$

Equation (1) shows that the media reporting strategy is conditional on the policy performance and relative bias of the outlet in favor of the central government. It is straightforward to see that unbiased media outlet ($\beta = 0$) according to Equation (1) always truthfully reports responsibility for policy outcomes, i.e. $\mathbb{1}[m_k = L] = \rho_k$. The second to last term of the equation (1) represent blame-shifting strategy of the central government in case when policy performance is low: Local government has chances to be reported responsible by biased media outlet ($\beta > 0$) for bad policy outcomes ($\theta_k = 0$) even if it is *not* responsible for the policy ($\rho_k = 0$). Given that the space of reports consists of only two possible messages, the opposite is true for the likelihood of reporting C. Analogously, last term of the equation (1) represent credit-claiming strategy of the central government: Biased media ($\beta > 0$) might attribute responsibility for good policy outcomes ($\theta_k = 1$) to central government even if the local government is in fact responsible ($\rho_k = 1$).[12] Again, the opposite in this case is true for the likelihood of reporting responsibility to the central government C.

As stated above I look at how representative citizen updates her beliefs after observing a message about responsibility for policy k from the media. Consider first the case where the citizen knows the degree of media bias and updates only about the leader's competence. The posterior expectation that responsibility for policy k is at local level (L) given each of the possible

$$\mathbb{E}[\rho_k \mid m_k = L, \theta_k, \beta] = \frac{(1-\beta\theta_k)\,\mathbb{E}[\rho_k]}{\beta(1-\theta_k) + (1-\beta)\,\mathbb{E}[\rho_k]}, \tag{2}$$

$$\mathbb{E}[\rho_k \mid m_k = F, \theta_k, \beta] = \frac{\beta\theta_k\,\mathbb{E}[\rho_k]}{\beta\theta_k + (1-\beta)\,\mathbb{E}[\rho_k]}. \tag{3}$$

In the limit, if media outlet is unbiased ($\beta = 0$), then any report that attributes policy responsibility to one of the levels of government is fully revealing, and upon observing it, citizens learn whether it is local or central government that is responsible for it. However, as long as media is at least partially biased, i.e. $\beta > 0$, there is a small chance that responsibility is being misreported by the media outlet in favor of the central government, and thus the message m_k is not fully credible: Citizen cannot perfectly infer whether the news report she observes reflects the true allocation of responsibility for policy covered, or the attempt of the media to deflect blame from or gain credit

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[12]This effectively excludes any role of possible belief about selective reporting by the media (i.e. when media does not report on policies with poor performance) from the scope of the study. This is plausible since the study intervention consists of showing one news report as opposed to continous exposure to media outlet. In the latter case we might expect subjects to notice relative shares of reporting on particular topics.

for central government. As the bias β approaches one, the posterior belief about responsibility for policy k, $\mathbb{E}[\rho_k \mid m_k, \theta_k, \beta]$ collapses to the prior belief $\mathbb{E}[\rho_k]$.

Another intuition that follows from Equation (2) suggests that if policy performance is good ($\theta_k = 1$) message that attributes responsibility to the local government (L) is fully revealing. This is due to the assumption that media, if biased, favors federal government and thus responsibility for high policy performance can be reported at the local level only when it is indeed at that level. In the opposite case (reporting L when $\theta_k = 0$) the message is not fully revealing, since biased media outlet is more likely to report observed message.

In what follows, I focus on the non-trivial case of how beliefs are updated following the critical reports that attribute policy outcomes in low performing public policy (road construction and natural disaster relief) to *local* government (L). While the model allows to study richer set of news reports, the empirical part of this study allows to estimate the effects of attribution to local government only. In addition, these types of messages along with positive messages that aim to gain credit for central government account for majority of nationwide state-owned media coverage on economic and political events in non-democratic settings like Russia. In other words, in this project I focus on theoretical evaluation and empirical estimation of the effects of observed propaganda reporting, rather than hypothetical propaganda reporting that might exist in a counter-factual world.

Equations (2) and (3) assume that citizens know both bias of the media outlet and specific public policy performance. While realistic for those citizens, who know or follow political and economic news, it is likely that majority of population has at least some degree of uncertainty about one or both. Specifically in Russian and other similar contexts it was shown that citizens take into account degree of bias of the source into account when evaluating the information they observe (Mickiewicz, 2004; Truex, 2016). This in turn implies that citizens in weak democratic contexts might directly *infer* the extent of bias from observing media outlet coverage. Updating is even more likely for policy performance, as this information might be directly or inplicitely covered in the news reports they observe.

To capture the simultaneous updating on primary outcomes, policy performance, responsibility allocation and media bias, I introduce beliefs about policy performance and media bias in addition to beliefs about responsibility. Formally, suppose that representative citizen is also uncertain about the degree of media bias in favor of central government $\beta \in [0, 1]$ and let $f_{\mathcal{B}}$ represent the PDF of citizen's prior belief about the media bias in favor of the central government with support $\mathcal{B} \subseteq [0, 1]$. Representative citizen is also uncertain about the policy performance, θ_k, prior to exposure to news report with some probability assigned to both *good* ($\theta_k = 1$) and *bad* ($\theta_k = 0$) policy outcomes. The posterior expectation about the allocation of responsibility for policy given the newly introduced

beliefs by the law of iterated expectations can be expressed as

$$\mathbb{E}[\rho_k \mid m_k = L] =$$
$$\int_{\mathcal{B}} \left[\begin{array}{c} \mathbb{E}[\rho_k \mid m_k = L, \theta_k = 1, \beta] \Pr(\theta_k = 1 \mid m_k = L) + \\ \mathbb{E}[\rho_k \mid m_k = L, \theta_k = 0, \beta] \Pr(\theta_k = 0 \mid m_k = L) \end{array} \right] f_{\mathcal{B}}(\beta \mid m_k = L) \, \mathrm{d}\beta, \qquad (4)$$

where $f_{\beta}(\beta \mid m_k = L)$ is the representative citizen's posterior belief about the extent of the media bias given the message that attributes policy k responsibility to local government. Analogously, $\Pr(\theta_k \mid m_k = L)$ corresponds to citizen's posterior belief about the policy k performance given the message that attributes policy k responsibility to local government.

By Bayes' theorem, the citizen's posterior belief about the extent of media bias is given by

$$f_{\mathcal{B}}(\beta \mid m = L) = \frac{\Pr(m = L \mid \beta) f_{\mathcal{B}}(\beta)}{\displaystyle\int_{\mathcal{B}} \Pr(m = L \mid \beta) f_{\mathcal{B}}(\beta) \, \mathrm{d}\beta}, \qquad (5)$$

$$\mathbb{E}[\theta_k \mid m = L] = \Pr(\theta_k = 1 \mid m = L) = \frac{\Pr(m = L \mid \theta_k = 1) \Pr(\theta_k = 1)}{\displaystyle\sum_{j \in \{0,1\}} \Pr(m = L \mid \theta_k = j) \Pr(\theta_k = j)}, \qquad (6)$$

where $\Pr(m = L \mid \beta)$ and $\Pr(m = L \mid \theta_k = 1)$ are *ex ante* probabilities that the media reports good news conditional on media bias and on good policy performance and directly follow from the equation (1). Plugging equations (5) and (6) into equation (4), we can derive the representative citizen's posterior expectation about the policy responsibility:

$$\mathbb{E}[\rho_k \mid m = L] =$$
$$= \int_{\mathcal{B}} \left[\frac{\mathbb{E}[\rho_k]}{(1 - \beta) \mathbb{E}[\rho_k] + \beta} + \frac{\beta(1 - \mathbb{E}[\rho_k])}{(1 - \beta) \mathbb{E}[\rho_k] + \beta} \mathbb{E}(\theta_k \mid m_k = L) \right] f_{\mathcal{B}}(\beta \mid m_k = L) \, \mathrm{d}\beta$$
$$= \int_{\mathcal{B}} \left[\frac{\mathbb{E}[\rho_k](1 - \beta \mathbb{E}[\theta_k])}{(1 - \beta) \mathbb{E}[\rho_k] + \beta(1 - \mathbb{E}[\theta_k])} \right] \frac{((1 - \beta) \mathbb{E}[\rho_k] + \beta(1 - \mathbb{E}[\theta_k])) f_{\mathcal{B}}(\beta)}{\displaystyle\int_{\mathcal{B}} \Pr(m = L \mid \beta) f_{\mathcal{B}}(\beta) \, \mathrm{d}\beta} \, \mathrm{d}\beta$$
$$= \frac{\mathbb{E}[\rho_k](1 - \mathbb{E}[\beta] \mathbb{E}[\theta_k])}{(1 - \mathbb{E}[\beta]) \mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])}. \qquad (7)$$

Equation (7) shows how exactly the posterior updating on the allocation of responsibility for policy k depends on the citizen's priors on the policy k performance and on the media bias in favor of central government. If citizen beliefs *a priori* that policy performance is good, $\mathbb{E}[\theta_k] \to 1$, then she strongly updates her beliefs about policy responsibility regardless of the extent of media bias, i.e. $\mathbb{E}[\rho_k \mid m = L] \to 1$. As was mentioned before this is due to media bias favoring only central government, but no local government. On the contrary, when prior belief that representative citizen holds is that policy performance is bad, $\mathbb{E}[\theta_k] \to 0$, then she will update strongly her beliefs about responsibility *only* if her prior beliefs about media bias are also low, i.e. $\mathbb{E}[\beta] \to 0$.

For the role of prior beliefs about media bias, the intuition that follows from the equation (7) is different. The higher the citizen's prior expectation that the media outlet sending the message favors central government, $\mathbb{E}[\beta] \to 1$, the less she is going to be persuaded by the media's message that attributes responsibility to the local government, $(\mathbb{E}[\rho_k \mid m = L] - \mathbb{E}[\rho_k]) \to 0$. On the contrary, if *a priori* representative citizen is expects that the media is fairly impartial, $\mathbb{E}[\beta] \to 0$, then she will strongly update her beliefs about allocation of responsibility upon observing message L, i.e. $\mathbb{E}[\rho_k \mid m = L] \to 1$.

Interestingly, these observations imply that for the citizen, who *a priori* believes that media is biased in favor of central government, their prior beliefs about policy performance do not affect change in their responsibility attribution upon observing public policy news reports. Note that the updating does not depend on the degree of prior certainty about either media bias or policy performance, but only on the expectation about those quantities.

The model above also allows us to generate predictions about updating about policy performance and media bias, two other primary outcomes of interest. Using equations (5) and (6) and taking expectation over the support of corresponding parameters we can get:

$$
\begin{aligned}
\mathbb{E}[\theta_k \mid m = L] &= \int_{\mathcal{B}} \frac{(1-\beta)\,\mathbb{E}[\rho_k]\,\mathbb{E}[\theta_k]}{(1-\beta)\,\mathbb{E}[\rho_k] + \beta(1-\mathbb{E}[\theta_k])} f_{\mathcal{B}}(\beta \mid m_k = L)\,\mathrm{d}\beta \\
&= \frac{(1-\mathbb{E}[\beta])\,\mathbb{E}[\rho_k]\,\mathbb{E}[\theta_k]}{(1-\mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1-\mathbb{E}[\theta_k])} \quad (8)
\end{aligned}
$$

$$
\begin{aligned}
\mathbb{E}[\beta \mid m = L] &= \int_{\mathcal{B}} \beta \frac{\Pr(m = L \mid \beta) f_{\mathcal{B}}(\beta)}{\displaystyle\int_{\mathcal{B}} \Pr(m = L \mid \beta) f_{\mathcal{B}}(\beta)\,\mathrm{d}\beta}\,\mathrm{d}\beta \\
&= \frac{\mathbb{E}[\beta]\,\mathbb{E}[\rho_k] + \left(\mathrm{Var}[\beta] + \mathbb{E}^2[\beta]\right)(1 - \mathbb{E}[\rho_k] - \mathbb{E}[\theta_k])}{(1-\mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1-\mathbb{E}[\theta_k])} \quad (9)
\end{aligned}
$$

In addition, it is noteworthy that the simultaneous updating on the primary outcomes of interest introduces dependence to posterior beliefs about those outcomes. Specifically we have

$$
\mathbb{E}[\rho_k \theta_k \mid m_k = L] \equiv \int_{\mathcal{B}} \Pr[\rho_k = 1 \wedge \theta_k = 1 \mid m_k = L] f_{\mathcal{B}}(\beta \mid m_k = L)\,\mathrm{d}\beta
$$

$$
= \frac{(1-\mathbb{E}[\beta])\,\mathbb{E}[\rho_k]\,\mathbb{E}[\theta_k]}{(1-\mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1-\mathbb{E}[\theta_k])}. \quad (10)
$$

Equation (10) implies that upon observing message that attributes responsibility to local government citizens will form beliefs about product of performance and responsibility for policy k that are similar to beliefs about performance only. The posterior beliefs about this quantity are especially important given that $\rho_k \theta_k$ in the model gives the amount of blame or credit for policy k that citizens assign to local government and thus can be used later to form predictions about the effect of news reporting on overall government evaluation.

Finally, equations (7) to (9) allow us to get the expressions for the main quantity of interest in the

empirical part of the project: The degree of updating upon observing news report that attributes policy k responsibility to the local government, L:

$$\Delta^{\rho_k} \equiv \mathbb{E}[\rho_k \mid m = L] - \mathbb{E}[\rho_k] = \frac{\mathbb{E}[\rho_k](1 - \mathbb{E}[\beta]\,\mathbb{E}[\theta_k])}{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])} - \mathbb{E}[\rho_k]$$

$$= \frac{(1 - \mathbb{E}[\rho_k])(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k]}{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])}, \tag{11}$$

$$\Delta^{\theta_k} \equiv \mathbb{E}[\theta_k \mid m = L] - \mathbb{E}[\theta_k] = \frac{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k]\,\mathbb{E}[\theta_k]}{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])} - \mathbb{E}[\theta_k]$$

$$= -\frac{(1 - \mathbb{E}[\theta_k])\,\mathbb{E}[\beta]\,\mathbb{E}[\theta_k]}{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])}, \tag{12}$$

$$\Delta^{\beta} \equiv \mathbb{E}[\beta \mid m = L] - \mathbb{E}[\beta_k] = \frac{\mathbb{E}[\beta]\,\mathbb{E}[\rho_k] + \left(\mathrm{Var}[\beta] + \mathbb{E}^2[\beta]\right)(1 - \mathbb{E}[\rho_k] - \mathbb{E}[\theta_k])}{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])} - \mathbb{E}[\beta]$$

$$= \frac{\mathrm{Var}[\beta](1 - \mathbb{E}[\rho_k] - \mathbb{E}[\theta_k])}{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])}. \tag{13}$$

It is straightforward to see that upon observing message that attributes policy responsibility to the local government representative citizen always updates positively (or at least non-negatively) her beliefs about policy k responsibility being at the local level. However observing message L downgrades citizens beliefs about policy k performance since this message is likely to be observed when the policy performance is low and central government tries to deflect blame using biased media.

Finally, direction of updating on the bias of the media outlet depends on the combination of prior beliefs about policy k responsibility and performance. If both are significantly high, i.e. $\mathbb{E}[\rho_k] + \mathbb{E}[\theta_k] > 1$, then it is likely that the report that attributes responsibility to the local level is due to media not favoring central government, since the latter in this case would want to claim credit for good policy outcomes which in turn would lower chances of observed report. Hence the belief held by citizen that media is biased decreases. On the contrary, if both beliefs about policy k are low, i.e. $\mathbb{E}[\rho_k] + \mathbb{E}[\theta_k] < 1$, then it is likely that the observed report is due to blame-shifting strategy of the central government and thus citizen updates positively her beliefs about media outlet bias. Hence the belief held by citizen that media is biased increases.

These results are summarized in Figures 2 and 3 using phase diagrams depicting direction and magnitude of belief updating for policy k upon observing news report that attributes responsibility for it to the local government. In addition to predictions about the direct effects of the news report on beliefs about primary outcomes, phase diagrams allow us to analyze a rich set of comparative statics:

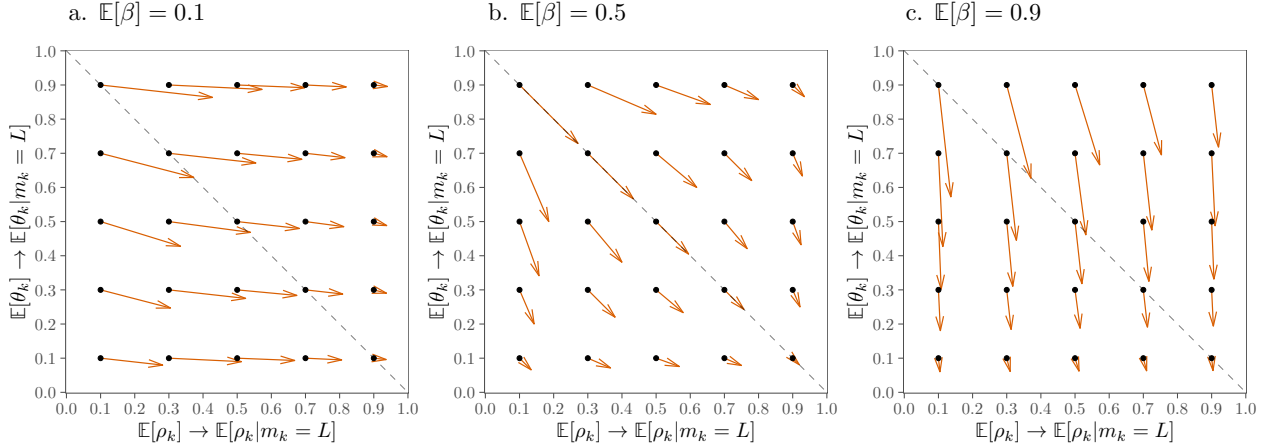1. Updating on policy responsibility *increases* ($\Delta^{\rho_k} \uparrow$) with prior on policy performance ($\mathbb{E}[\theta_k] \uparrow$) according to Figure 3, and *decreases* ($\Delta^{\rho_k} \downarrow$) with prior on media bias ($\mathbb{E}[\beta] \uparrow$) according to Figure 2;

2. Updating on policy performance *increases* ($\Delta^{\theta_k} \uparrow$) with prior on policy responsibility being

at the local level ($\mathbb{E}[\rho_k] \uparrow$) according to Figure 3, and *decreases* ($\Delta^{\theta_k} \downarrow$) with prior on media bias ($\mathbb{E}[\beta] \uparrow$) according to Figures 2 and 3;

3. According to Figure 2, updating on media bias *decreases* ($\Delta^{\theta_k} \uparrow$) with prior on media bias ($\mathbb{E}[\beta] \uparrow$), policy responsibility being at the local level ($\mathbb{E}[\rho_k] \uparrow$), and prior on policy performance ($\mathbb{E}[\theta_k] \uparrow$).
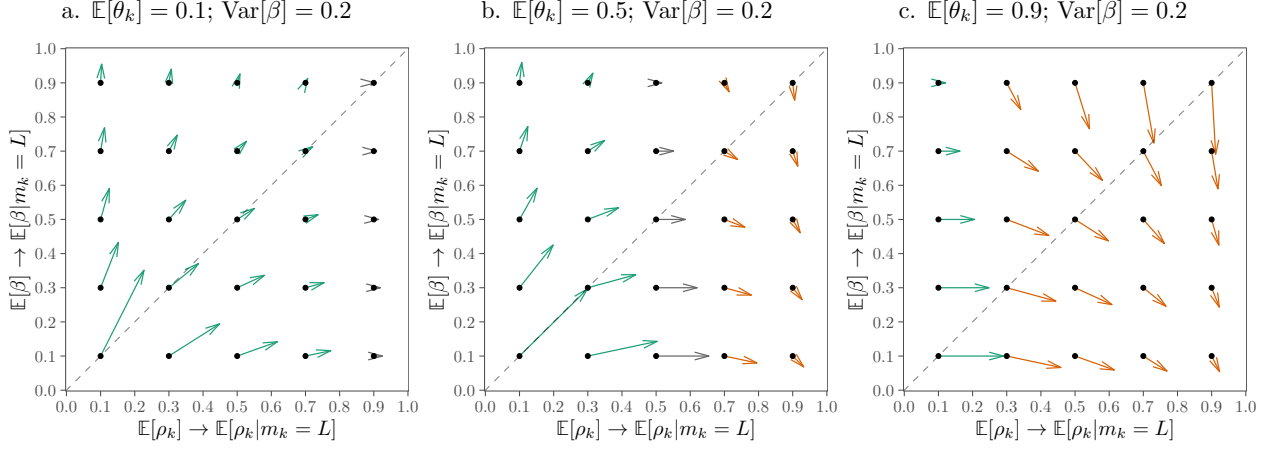
Figure 2: Phase diagrams of simultaneous updating on policy k responsibility (ρ_k) and media bias (β) upon observing message $m_k = L$ given prior beliefs about policy k performance ($\mathbb{E}[\theta_k]$). Black dots represent values of priors and arrows represent direction and normalized extent of updating. Color represents positive/zero/negative updating on y-axis.

Figure 3: Phase diagrams of simultaneous updating on policy k responsibility (ρ_k) and performance (θ_k) upon observing message $m_k = L$ given beliefs about media bias ($\mathbb{E}[\beta]$). Black dots represent values of priors and arrows represent direction and normalized extent of updating. Color represents positive/zero/negative updating on y-axis.

3.1.2 Secondary outcomes

As a secondary outcome, upon updating on primary outcomes citizens update their overall evaluation of politicians at different levels according to their beliefs about responsibility allocation and policy performance. Importantly, I assume that citizens only punish/reward government based on

policies for which they believe respective level of government to be responsible. More formally, the overall evaluation of politician at level $j \in \{L, C\}$ is assumed to be given by

$$\gamma_j \equiv \rho_{k,j}(2\theta_k - 1) + \sum_{i \neq k} \rho_{i,j}(2\theta_i - 1) \tag{14}$$

where γ_j denotes evaluation of politician at level j by representative citizen.[13] Importantly both policies covered in the intervention media reports are assumed to be part of citizen evaluation of the government at different levels, i.e. $D, R \in \mathcal{K}$.[14] Equation (14) implies that government at level j can only be punished by citizens based on performance in policies for which they are considered to be (at least partially) responsible.

Upon observing news report m_k citizen first updates her beliefs about primary outcomes, including policy k performance and responsibility allocation, and then updates her beliefs about government competence at each level according to equation (14). Thus we can express the extent of updating on government competence as follows:

$$
\begin{aligned}
\Delta^{\gamma_L} &\equiv \mathbb{E}[\gamma_L \mid m = L] - \mathbb{E}[\gamma_L] \\
&= \frac{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k]\,\mathbb{E}[\theta_k] - \mathbb{E}[\rho_k](1 - \mathbb{E}[\theta_k])}{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])} - \mathbb{E}[\rho_k](2\,\mathbb{E}[\theta_k] - 1),
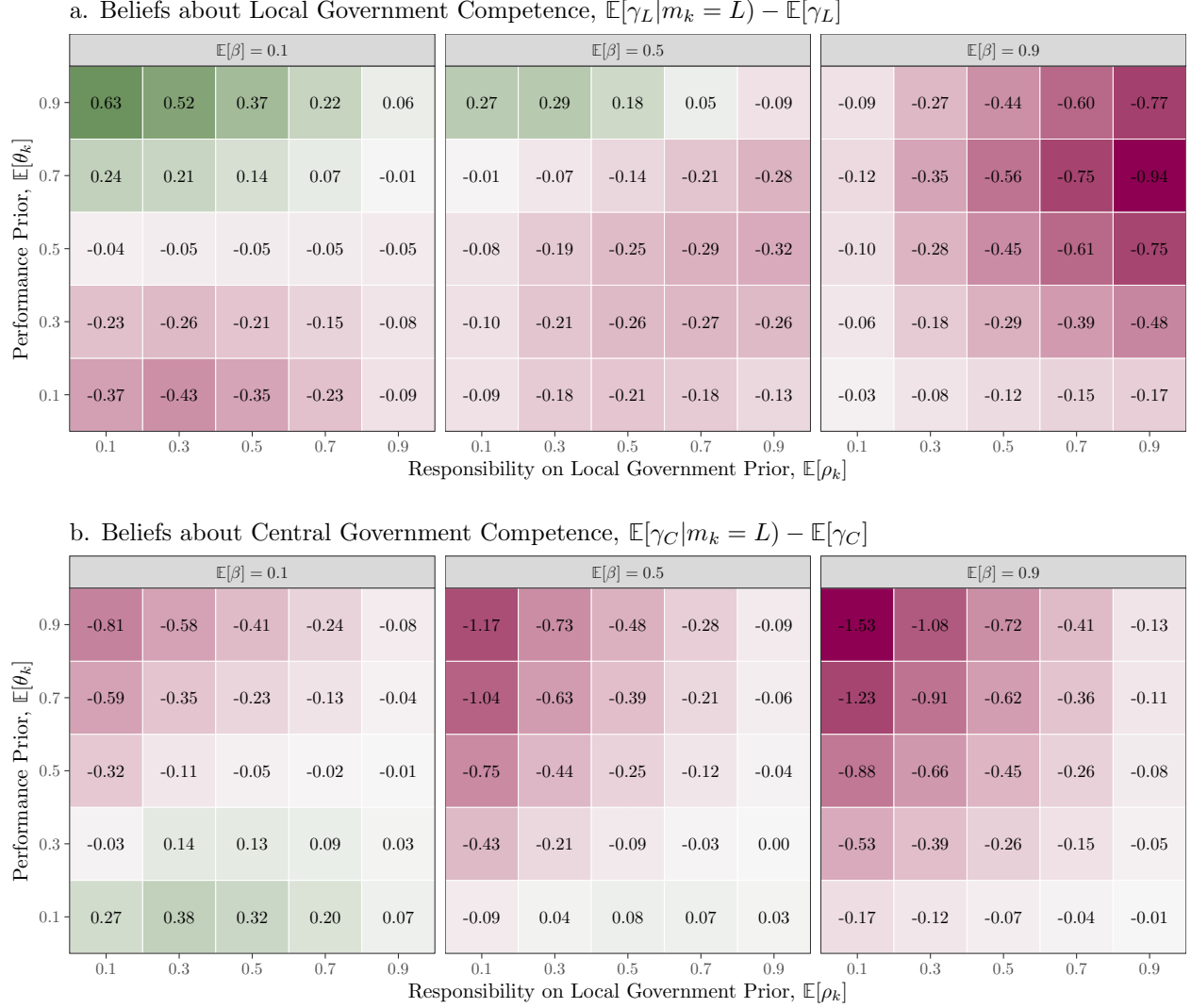\end{aligned}
\tag{15}
$$

$$
\begin{aligned}
\Delta^{\gamma_L} &\equiv \mathbb{E}[\gamma_L \mid m = L] - \mathbb{E}[\gamma_L] \\
&= -\frac{(1 - \mathbb{E}[\rho_k])(1 - \mathbb{E}[\theta_k])\,\mathbb{E}[\beta]}{(1 - \mathbb{E}[\beta])\,\mathbb{E}[\rho_k] + \mathbb{E}[\beta](1 - \mathbb{E}[\theta_k])} - (1 - \mathbb{E}[\rho_k])(2\,\mathbb{E}[\theta_k] - 1).
\end{aligned}
\tag{16}
$$

Note that equations (15) and (16) implicitly assume that beliefs about responsibility and performance for policies not covered in the media message are unaffected by reporting on policy k. This is likely the case in the context of the study given that there exists multitude of public policies for which different levels of government might be responsible and citizens are likely to be unaware about intradependency between performance and responsibility for different policies. In addition, the since it is assumed that responsibility for policies covered in media reports can only be assigned to central or local government, I assume that messages do not affect evaluation of any other political actors.

Figure 4 shows heatmap plots of simulated example of updating on government competence given priors about underlying primary parameters: Policy performance, responsibility and media bias. A cursory look suggests three main patterns:

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[13]Richer model can introduce weights citizens attach to the policy, i.e. $\gamma_j \equiv \frac{\omega_k \rho_{k,j}(2\theta_k - 1) + \sum_{i \neq k} \omega_i \rho_{i,j}(2\theta_i - 1)}{\sum_{i=1}^{N} \omega_i}$, where ω_i denotes relative weight given by representative citizen to policy outcome i with $N = |\mathcal{K}|$ denoting all possible policy domains considered by representative citizen in their evaluation of politicians at different levels.

[14]This assumption is likely to be the case, since both policies are funded and implemented by the government. In addition, this assumption is empirically verifiable using the self-reported ranking priority of policies in the survey data collected for the project.

a. Beliefs about Local Government Competence, $\mathbb{E}[\gamma_L | m_k = L) - \mathbb{E}[\gamma_L]$

b. Beliefs about Central Government Competence, $\mathbb{E}[\gamma_C | m_k = L) - \mathbb{E}[\gamma_C]$

Figure 4: Simulation of belief updating upon observing message $m_k = L$ given priors on policy k performance, $\mathbb{E}[\theta_k]$, and responsibility, $\mathbb{E}[\rho_k]$, and on media bias, $\mathbb{E}[\beta]$. Numbers inside tiles and colors show the simulated direction and magnitude of updating.

1. Looking at the upper-right triangle of each heatmap in panel b in the Figure 4 suggests that sending messages that attribute policy outcomes to local government (L) is not always beneficial for the central government. This is especially the case if the prior beliefs about policy performance are high ($\mathbb{E}[\theta_k] \to 1$) and *a priori* citizens attribute policy responsibility to central government ($\mathbb{E}[\rho_k] \to 0$);

2. Looking at the right plots of each panel in the Figure 4 suggests that if citizens *a priori* believe media to be biased in favor of central government ($\mathbb{E}[\beta] = 0.9$), they will punish the government level that is *a priori* perceived to be responsible for the policy for poor policy performance. That is due to citizens ability to discern blame-shifting strategy of the central government and instead of updating on responsibility assignment that is covered in the message, update on policy k performance (see right-most phase diagram of Figure 3);

3. Looking at the bottom part of left and middle plots of each panel in the Figure 4 suggests that if citizens *a priori* believe media not to be strongly biased in favor of the central government ($\mathbb{E}[\beta] \leq B^{15}$) and policy performance to be sufficiently low ($\mathbb{E}[\theta_k] \leq 0.5$), sending message that attributes policy responsibility to local government is actually efficient at deflecting some of the blame for likely bad policy performance. That is if citizens trust the media enough they will indeed become more likely to attribute low policy outcomes to local government upon observing message L which in this case is beneficial to the central government (as opposed to the case when prior beliefs about policy performance are high).

The last point above actually serves as a proof of concept for the empirical design of the study, since for both of the policies covered in the treatment news reports, road construction and natural disaster prevention, in the study context citizens are expected to be at least partially dissatisfied with government performance.

The proposed intervention aims to induce shock to beliefs about allocation of responsibility for specific policy (infrastructure or natural disaster relief) between different levels of government, $\rho_{k,j}$. Importantly the two treatment reports used in the intervention correspond to $m_D = L$ and $m_R = L$ and low policy performance for both policies.[16] While not fully representative of reporting strategy employed by state-owned media outlet in Russia, these reports are good example of blame-shifting by central government, which is why low policy performance is being attributed to the local government by state-owned media in the first place. The placebo report described in the previous section is denoted by $m_P \equiv \emptyset$, i.e. that the report contains no public policy performance or responsibility information.

It is assumed that the placebo m_P report has no systematic effect on any policy evaluations and thus can serve as a benchmark for estimation of the effects of treatment reports that directly

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[15]Here $B = \dfrac{\mathbb{E}[\rho_k](1 - 2\,\mathbb{E}[\theta_k])}{\mathbb{E}[\rho_k](1 - 2\,\mathbb{E}[\theta_k]) + 2\,\mathbb{E}[\theta_k](1 - \mathbb{E}[\theta_k])}$. Note that $\dfrac{\partial B}{\partial \mathbb{E}[\rho_k]} \geq 0$ and $\dfrac{\partial B}{\partial \mathbb{E}[\theta_K]} \leq 0$ which implies that the range in which blame-shifting by central government is possible shrinks as the *a priori* beliefs about policy performance improves, but increases in the prior attribution of responsibility to local government.

[16]That said, the road construction report, m_R, mentions briefly federal funding for the road construction, which might have positive effect on perception of policy performance by federal government.

cover public policy. More formally, I assume that $\mathbb{E}[\xi \mid m_P] = \mathbb{E}[\xi]$, where ξ represents any of the parameters of interest discussed above. As for the bias of the media, since placebo report used in the study is coming from the same outlet as the treatment reports, there is a chance that citizens exposed to placebo message will update their beliefs about media bias. That said, since placebo report does not mention or discuss any economic or political events, it is unlikely that citizens will update specifically beliefs about β, extent of bias in favor of the central government.[17]

3.2 Main predictions

The simple Bayesian updating framework laid out above allows to generate predictions about the effects of treatment reports on beliefs about primary outcomes and secondary outcomes. Since the experiment will be conducted in one round, I will not be able to measure individual prior beliefs, so the predictions below pertain to differences in mean posterior beliefs between experimental groups. In what follows I use the following notation to denote differences in mean posterior beliefs for outcome μ between experimental groups in which respondents were exposed to report l and s:

$$\forall l, s \in \{D, R, P\} : \Delta^\xi(m_l, m_s) \equiv \mathbb{E}[\xi \mid m_l] - \mathbb{E}[\xi \mid m_s] = \mathbb{E}[\xi \mid m_l] - \mathbb{E}[\xi], \tag{17}$$

where D stands for natural disaster policy, R stands for roads infrastructure, and P stands for placebo video. Set of the quantities of interest includes all key parameters discussed in the preceding section: $\xi \in \{\theta_D, \theta_R, \rho_D, \rho_R, \beta, \gamma_L, \gamma_C\}$. As was mentioned above, in forming theoretical predictions I assume $\mathbb{E}[\xi \mid m_P] = \mathbb{E}[\xi]$, i.e. upon observing placebo news report citizens do not update directly on the public policy performance and responsibility, and thus reveal their prior beliefs about those parameters.

Based on the discussion in the preceding section, the predictions about the effects of exposure to m_R and m_D on the primary outcomes are as follows:

Prediction P1 (Responsibility Attribution)
For any non-degenerate set of prior beliefs about policy k responsibility, $\mathbb{E}[\rho_k] \in (0, 1)$, news coverage that attributes responsibility for policy k performance to local government ($m_k = L$) has positive *effect on the attribution of responsibility for to the local government and* negative *effect on the attribution of responsibility to the central government. Formally,*

$$\Delta^{\rho_D}(m_D, m_P) > 0,$$
$$\Delta^{\rho_R}(m_R, m_P) > 0.$$

Prediction P2 (Policy Performance)

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[17]Using control group responses to proxy for pre-treatment beliefs requires one key assumptions: That placebo control group respondents are similar to treatment group respondents. In short, I expect that randomization and the lack of selection into the endline sample support this assumption. This assumption also can be indirectly tested using question about direction of the media bias asked prior to exposure to media messages.

For any non-degenerate set of prior beliefs on policy k performance, $\mathbb{E}[\theta_k] \in (0,1)$, news coverage that attributes responsibility for policy k performance to local government ($m_k = L$) has negative effect on the beliefs about respective policy performance compared to the news coverage that does not mention policy k. Formally,

$$\Delta^{\theta_D}(m_D, m_P) < 0,$$
$$\Delta^{\theta_R}(m_R, m_P) < 0.$$

Prediction P3 (Media Bias)

For any non-degenerate set of prior beliefs about media outlet bias in favor of central government, $\mathbb{E}[\beta] \in (0,1)$, news coverage that attributes responsibility for policy k performance to local government ($m_k = L$) has negative effect on beliefs about media bias if a priori *beliefs about policy k performance and responsibility at the local level are sufficiently high, and* vice versa*. Formally,*

$$\mathbb{E}[\rho_k] + \mathbb{E}[\theta_k] > 1 \Rightarrow \Delta^{\beta}(m_D, m_P) < 0, \Delta^{\beta}(m_R, m_P) < 0,$$
$$\mathbb{E}[\rho_k] + \mathbb{E}[\theta_k] \leq 1 \Rightarrow \Delta^{\beta}(m_D, m_P) > 0, \Delta^{\beta}(m_R, m_P) > 0.$$

Prediction P4 (Government Competence)

For any non-degenerate set of prior beliefs about government competence, $\mathbb{E}[\gamma_L] \in (0,1)$ and $\mathbb{E}[\gamma_C] \in (0,1)$, news coverage that attributes responsibility for policy k performance to local government ($m_k = L$) has negative effect on local government evaluation and positive effect on central government evaluation if prior beliefs about policy performance are low enough ($\mathbb{E}[\theta_k] \leq \frac{1}{2}$) and media is not strongly believed to be biased in favor of central government ($\mathbb{E}[\beta] \leq B$). Formally,

$$\Delta^{\gamma_L}(m_D, m_P) < 0, \Delta^{\gamma_L}(m_R, m_P) < 0,$$
$$\Delta^{\gamma_C}(m_D, m_P) > 0, \Delta^{\gamma_C}(m_R, m_P) > 0.$$

Prediction P5 (No Interaction Between Policies)

- *News coverage that attributes responsibility for policy k performance to local government ($m_k = L$) does not have any effect on beliefs about responsibility or performance in other policies and thus can serve as additional placebo group. Formally, for the comparison to the message that doesn't mention any policy*

$$\Delta^{\theta_D}(m_R, m_P) = 0, \ \Delta^{\theta_R}(m_D, m_P) = 0,$$
$$\Delta^{\rho_D}(m_R, m_P) = 0, \ \Delta^{\rho_R}(m_D, m_P) = 0,$$

and for the comparison to the message that mentions irrelevant policy

$$\Delta^{\theta_D}(m_D, m_R) < 0, \ \Delta^{\theta_R}(m_R, m_D) < 0,$$

$$\Delta^{\rho_D}(m_D, m_R) < 0, \ \Delta^{\rho_R}(m_R, m_D) < 0.$$

Prediction P6 (Heterogeneity by Priors)

- *The effect of news coverage that attributes responsibility for policy k performance to local government on beliefs about responsibility allocation ($\mathbb{E}[\rho_k \mid m_k = L] - \mathbb{E}[\rho_k]$) increases with prior beliefs about policy k performance ($\mathbb{E}[\theta_k]$) and decreases with prior beliefs about media bias ($\mathbb{E}[\beta]$). Formally,*

$$\frac{\partial \Delta^{\rho_R}(m_R, m_P)}{\mathbb{E}[\theta_R]} > 0, \ \frac{\partial \Delta^{\rho_D}(m_D, m_P)}{\mathbb{E}[\theta_D]} > 0,$$

$$\frac{\partial \Delta^{\rho_R}(m_R, m_P)}{\mathbb{E}[\beta]} < 0, \ \frac{\partial \Delta^{\rho_D}(m_D, m_P)}{\mathbb{E}[\beta]} < 0.$$

- *The effect of news coverage that attributes responsibility for policy k performance to local government on beliefs about policy performance ($\mathbb{E}[\theta_k \mid m_k = L] - \mathbb{E}[\theta_k]$) increases with prior beliefs about policy k responsibility being on the local government ($\mathbb{E}[\rho_k]$) and decreases with prior beliefs about media bias ($\mathbb{E}[\beta]$). Formally,*

$$\frac{\partial \Delta^{\theta_R}(m_R, m_P)}{\mathbb{E}[\rho_R]} > 0, \ \frac{\partial \Delta^{\theta_D}(m_D, m_P)}{\mathbb{E}[\rho_D]} > 0,$$

$$\frac{\partial \Delta^{\theta_R}(m_R, m_P)}{\mathbb{E}[\beta]} < 0, \ \frac{\partial \Delta^{\theta_D}(m_D, m_P)}{\mathbb{E}[\beta]} < 0.$$

- *The effect of news coverage that attributes responsibility for policy k performance to local government on beliefs about media bias in favor of central government ($\mathbb{E}[\beta \mid m_k = L] - \mathbb{E}[\beta]$) decreases with prior beliefs about policy k performance ($\mathbb{E}[\theta_k]$) and responsibility being on the local government ($\mathbb{E}[\rho_k]$) as well as with prior beliefs about media bias ($\mathbb{E}[\beta]$). Formally,*

$$\frac{\partial \Delta^{\beta}(m_R, m_P)}{\mathbb{E}[\rho_R]} < 0, \ \frac{\partial \Delta^{\beta}(m_D, m_P)}{\mathbb{E}[\rho_D]} < 0,$$

$$\frac{\partial \Delta^{\beta}(m_R, m_P)}{\mathbb{E}[\theta_R]} < 0, \ \frac{\partial \Delta^{\beta}(m_D, m_P)}{\mathbb{E}[\theta_D]} < 0,$$

$$\frac{\partial \Delta^{\beta}(m_R, m_P)}{\mathbb{E}[\beta]} < 0, \ \frac{\partial \Delta^{\beta}(m_D, m_P)}{\mathbb{E}[\beta]} < 0.$$

- *The effect of news coverage that attributes responsibility for policy k performance to local government on beliefs about competence of the central government ($\mathbb{E}[\gamma_C \mid m_k = L] - \mathbb{E}[\gamma_C]$)*

decreases with prior beliefs about media bias ($\mathbb{E}[\beta]$). Formally,

$$\frac{\partial \Delta^{\gamma_C}(m_R, m_P)}{\mathbb{E}[\beta]} < 0, \ \frac{\partial \Delta^{\gamma_C}(m_D, m_P)}{\mathbb{E}[\beta]} < 0.$$

3.3 Sub-group and heterogeneous effects

In addition to the predictions that directly follow from Bayesian updating model above, I plan to test a number of predictions that pertain to heteroegeneous effects of media reports on posterior beliefs with respect to a number of mediators. Such mediators include (for the wording of specific questions see Online survey instrument):

1. **Citizens comprehension:** Citizens with higher ability to comprehend messages contained in experimental news reports might be more likely to update their beliefs about policy performance, responsibility allocation and bias of the media outlet in line with Bayesian updating logic. I plan to test this prediction using respondents level of education from `education` question in the survey cross-validated with the panelist information provided by OMI survey company.

2. **Citizens knowledge of politics:** In addition, I will use questions `BLknowsgovernor` and `BLknowslocal` to assess citizens pre-treatment knowledge of politics. Expectation here is that citizens with higher pre-treatment knowledge of local politics, are more likely to know the topics covered in the treatment news reports, and thus are less likely to update in the expected direction. I will supplement measures of factual prior knowledge about politics with the overall measure of frequency of news consumption based on question `BLmediatype`.

3. **Media exposure:** Higher levels of exposure to specific media outlets can make citizens more susceptible to the features of coverage provided by that outlet. In the study we measure type of media (`BLmediatype`), national TV channel (`BLmediaview`), and local media outlets (`BLmedialocal`) that measure respondents patterns of media consumption. I epxect that more TV viewership and more viewership of state-owned TV channels are reflective of higher belief that *Rossia-1* TV channel is not biased. On the contrary, higher consumption of Internet-based news sources and non state-owned TV channels should be reflective of higher skepticism about pro-government coverage and higher beliefs about *Rossia-1* TV channel bias in favor of federal government. Finally, higher viewership of local state-owned media should expose citizens to positive coverage on the regional and local government performance and thus is likely to make citizens less likely to change their beliefs about local and regional government performance.

4. **Prior policy exposure:** Pocketbook evaluations of policies are oftentimes assumed to reduce effectiveness of media persuasion. Thus, we can expect that citizens who recently had first-hand exposure to one of the policies covered in experimental news reports might decrease update their beliefs about those policies less after receiving message from the media, regardless

21

of their belief its bias. I will use questions `BLpolicyexposure`, `BLknowsff`, `BLexperienceff` and `BLknowsforestfiresregions` to approximate citizens' policy exposure to relevant policies. I expect that citizens with less policy exposure prior to the treatment will exhibit higher extent of updating according to Bayesian logic in the previous section.

5. **Geographical proximity:** In addition to prior policy exposure, I plan to use data on geographic location of respondents (from question `locality` cross-validated by data about respondents locality from OMI survey company) in the survey to approximate their exposure to natural disaster prevention, specifically, to summer forest fires in Siberia and Far East of Russia. As with prior policy exposure, I expect that citizens who reside in localities that were directly affected either by forest fires or by smoke from them, to exhibit lower levels of Bayesian updating on all of the main outcomes of interest upon receipt of news report that attributes responsibility for prevention of forest fires to the local government.

6. **Policy importance:** It is likely that citizens who put higher priority on specific policy, are more likely to pay attention to the news coverage about this policy. I plan to use question `BLpolicypriority` and see whether higher priority given to either road construction or to natural disaster prevention makes citizens more likely to update their beliefs about respective public policy according to the predictions of Bayesian framework above.

7. **Difference in exposure between regions:** I also plan to explore geographic differences between the four regions covered in the study. Specifically, only two of the regions (Irkutsk and Krasnoyarsk) had large scale forest fires within their borders in the Summer 2019, while smoke from those fires was noticeable in most of the cities in all four regions. Thus it is less likely that respondents in those regions that did not have fires during the Summer 2019, will be susceptible to the media reports that attribute natural disaster policy responsibility to regional and local governments. On the contrary, respondents in Irkutsk and Krasnoyarsk regions are expected to react to message that attributes responsibility for forest fires prevention to local government according to the Bayesian updating logic, since the responsibility for Summer 2019 forest fires can indeed be attributed to the local government in those regions.

8. **Difference in political structure:** In addition to the exposure to forest fires and their consequences, four regions in the study differ substantively in terms of political structure and political control of main executive offices. Specifically, Novosibirsk and Irkutsk regions both have or recently had local and regional executives from Communist party, which in the elections at those levels runs in opposition to dominant United Russia party. Krasnoyarsk and Kemerovo regions, on the contrary, can be considered United Russia strongholds and have both regional and local offices fully controlled by the dominant party. I expect that blame-shifting by federal government is more likely to work effectively in the regions that are controlled by United Russia, i.e. Krasnoyarsk and Kemerovo.

3.4 Alternative explanations

The Bayesian updating approach laid out in Main predictions is oftentimes criticized by scholars for imposing rationality assumption on individual beliefs, attitudes and behaviors. While serving as a useful and internally consistent benchmark for testing belief updating, there is a number of mechanisms alternative to the discussed above that can explain how citizens react to media reports that attribute responsibility for public policy outcomes. Below I discuss a number of such mechanisms and highlight predictions that follow from them that can be tested empirically in this study. For the wording of specific questions see Online survey instrument.

1. **No updating on performance and media bias:** The assumption that citizens update rationally on the parameters that are not directly covered in the media reports about policy responsibility, such as media bias and policy performance, is quite strong. Alternatively we can consider a model in which citizens update only on the parameters that are directly mentioned in the media coverage, for example allocation of responsibility in the context of this study. It is straightforward to see that in this case the updating on responsibility will be guided by equation (2): News message that attributes responsibility to local government will always increase beliefs that responsibility lies at the local level.

2. **Direct updating on policy performance:** The theoretical framework presumes that reports only contain information about responsibility allocation. The actual news reports used in the study might also inform citizens about policy performance directly, in which case we can expect that effectiveness of blame-shifting by the central government might increase due to increase in negative updating on policy performance (see Figure 4).

3. **Extreme prior beliefs about media bias:** If citizens hold extreme prior beliefs about media bias (i.e. $\mathbb{E}[\beta] \to 1$), it might lead them to fully disregard information provided by the outlet. Thus if prior to treatment citizens hold strong beliefs that media is biased in favor of the central government, we might expect them not to update any beliefs and fully disregard treatment news coverage.

4. **Selective reporting by media:** Another reason for disregarding information contained in the news is that citizens presume that media reports selectively in favor of one of the levels of government. Given the contents of the news reports used in this study, message that attributes responsibility for policy with low performance to local government is likely to come from the media that reports selectively in favor of the central government. In this case citizens might update their beliefs about policy responsibility and performance even if they receive placebo reports that do not cover the policy directly. In addition they will increase their beliefs that the media is selectively reporting in favor of the central government. To test whether prior beliefs about selective reporting affect updating on policy responsibility and performance and media bias I will use questions `BLmediabias2`–`BLmediabias4` to estimate treatment effect heterogeneity.

5. **Halo effect:** The theory of Bayesian updating presumes that citizens do not update on policy j if the report they observe covers other policy i. At the same time, given the structure of the survey there are reasons to believe that change in beliefs about policy i can cause similar change in beliefs about policy j. To assess interdependence of beliefs about different policies, I will use the fact that ordering of post-treatment policy questions was randomized, such that each respondent saw group of questions about road construction before group of questions about natural disaster prevention with probability $\frac{1}{2}$, and *vice versa*. To do this I will look at subsamples of respondents who received specific media report and estimate whether order of presentation of policy questions had an effect on reported beliefs about responsibility and performance of irrelevant policy.

   - If I observe evidence in favor of ordering effects, I will report tests of main predictions of the theory separately for subsets of those who received relevant policy evaluation first and last.
   - If I find evidence for effects of media reports on both relevant and irrelevant policy, but no ordering effects I will conclude that there is evidence for *Halo effects* and will use mean index to combine specific outcomes for both policies to estimate the extent of joint updating on all policies.

6. **Attributing bad policy outcomes to local government:** Instead of updating rationally their beliefs about policy responsibility after observing relevant information, citizens might be predisposed to blame local government for bad policy performance and credit central government for good policy outcomes (or *vice versa*). If this is the case, the Bayesian updating framework above does not give correct predictions about citizens' posterior beliefs about responsibility and evaluation of politicians' competence. To measure such tendencies, I will use survey experiment embedded in the instrument prior to the main treatment. Specifically each respondent was randomly shown either negative or positive hypothetical scenario about health care policy in one of the regions (`BLscenario2negative` or `BLscenario2positive`) and was then asked to attribute responsibility for the outcome to either local or central government. Both negative and positive scenarios explicitly mention that responsibility for health care provision is at the local levels. If respondents tend to attribute policy outcomes to specific level of government we would on average observe no effect of policy outcome on the level of government the policy responsibility is being attributed to. On the other hand, if there are differences in attribution of responsibility between the two scenarios, it is likely that citizens tend to attribute positive (negative) policy outcomes to one of the levels of government.

7. **Blame vs. capacity to change:** The extent to which citizens update their beliefs about responsibility allocation upon observing news depends on which type responsibility we are measuring. First, as a result of exposure to media citizens might change their attribution of blame/credit for the policy outcomes they observe. This aspect of responsibility is at

the core of this project, and in the theoretical framework above we presume that central government aims to shift blame/credit perceptions using biased media. Second, citizens might also change their perceptions about capacity of certain levels of government to intervene and change policy outcomes. As opposed to shifting of blame, it might be the case that central government wants to preserve the image of high capacity despite denying responsibility for low policy outcomes. To assess possible differences in updating on blame/credit attribution as opposed to capacity, after treatment I ask respondents to assign responsibility for each of the main policies of interest (road construction and natural disasters) using both definitions of the responsibility discussed in random order (question `ELffrespcapacity`, `ELffrespblame` for natural disasters and `ELroadrespblame`, `ELroadrespcapacity` for road construction). I expect that the logic of Bayesian updating should apply more to blame/credit assignment rather than to capacity. This will be confirmed if we observe updating according to the main theory on responsibility measured using blame frame, but no or opposite updating on responsibility measured using capacity frame. If updating on both measures will be similar (especially for those who were assigned to receive particular type of frame first), it would suggest that citizens do not distinguish between those concepts of responsibility and I will use an average index of both frames as the main responsibility outcome for specific policy.

8. **Local government represents central government:** Most of the regional and even municipal governments in Russia, despite being elected, *de facto* are captured by the dominant party, United Russia. If citizens understand this, they might attribute responsibility for policy outcomes to central government regardless of whether they think that primary responsibility lies at the local level. To address this potential explanation I measure extent to which citizens think that local (regional) government represents interests of central government using question `BLgovernorlocal`. I expect that citizens who do *not* view local government as representing central government interests are more likely to update according to the main predictions above, while those who do are more likely to disregard blame-shifting by the central government and to attribute all responsibility for both public policies studied in this project to the central government.

9. **Regional vs. municipal government:** Throughout the theoretical framework above for simplicity I assumed that there is only one local level of government. In fact in Russia there are at least two levels of government that citizens can consider local: Regional and municipal levels. It is plausible that citizens can attribute different responsibility to those levels. Both treatment news reports attribute policy responsibility to both local and regional levels of government, hence I presume that citizens will update their beliefs about responsibility of both of those levels of government according to the predictions of main theoretical framework. That said, questions that measure responsibility attribution in the survey instrument allow respondents to distinguish between two lower levels of government. If I will find evidence that citizens update not just on allocation of responsibility between central and local government,

but also between regional and municipal government, I expect higher extent of updating on responsibility and performance for municipal government than for regional government.

4 Measurement

This project employs online survey experiment for the measurement of the key parameters of interest outlined above. The survey instrument used is presented in the Appendix section Online Survey Instrument and it followed the following structure:

- Baseline (`BL`)
    1. Basic filtering characteristics (age, region and locality of residence)
    2. Patterns of viewership and consumption of federal and local media (specifically, news about public medical services, public education, and road quality) and overall perception of bias of media in Russia
    3. Political knowledge
    4. Political attitudes on distribution of power between local vs federal government
    5. Prior exposure to variety of public policies (including road construction and natural disaster prevention)
    6. Attention check (question that asks to pick specific options)
- Treatment and placebo news reports (approx. 1 minute each) with option to proceed available only after the end of the video
- Endline (`EL`)
    1. Manipulation checks (questions about evaluation and contents of the news report)
    2. Attitudes towards redistribution
    3. Perception of bias of the *Rossia-1* TV Channel, the source of the experimental news reports
    4. Perception of responsibility and performance on the road construction and natural disaster prevention presented in a random order
    5. Evaluation of executives at the three main levels of government in Russia: Federal, regional and municipal
    6. Addition socio-economic questions (gender, income, education)
    7. Demand effects measurement

I operationalize the main parameters of the formal model in the section Theoretical Predictions using the answers to a number of questions. Tables 1 to 4 lay out the mapping between questions in the survey instrument, variable construction and theoretical quantities.

Table 1: Main outcomes from Section 3.2

Question	Scale	Parameters	Predictions
ELroadrespblame. Please rank the following levels of government in Russia in the order of their *responsibility (in terms of blame and credit) for the current* quality of roads where you live?; ELroadrespcapacity. Please rank the following levels of government in Russia in the order of their *capacity to change* quality of roads where you live?	Binary; Ordinal low to high ([0, 1])	$\mathbb{E}[\rho_R \mid m_k]$; $\mathbb{E}[\rho_R]$	P1, P5 and P6
ELffrespblame. Please rank the following levels of government in Russia in the order of their *responsibility (in terms of blame and credit) for the current* natural disasters prevention and relief measures where you live?; ELffrespcapacity. Please rank the following levels of government in Russia in the order of their *capacity to change* natural disasters prevention and relief measures where you live?	Binary; Ordinal low to high ([0, 1])	$\mathbb{E}[\rho_D \mid m_k]$; $\mathbb{E}[\rho_D]$	P1, P5 and P6
ELroadsatis. Are you satisfied with the quality of roads where you live?; ELsatisoverall1. In general, are you satisfied with the state of affairs in your locality?	Ordinal low to high ([0, 1])	$\mathbb{E}[\theta_R \mid m_k]$; $\mathbb{E}[\theta_R]$	P2, P5 and P6
ELffsatis. Are you satisfied with natural disasters (e.g. forest fires) prevention and relief where you live?; ELsatisoverall1. In general, are you satisfied with the state of affairs in your locality?	Ordinal low to high ([0, 1])	$\mathbb{E}[\theta_D \mid m_k]$; $\mathbb{E}[\theta_D]$	P2, P5 and P6
ELmediabias1. Do you agree that TV channel *Rossia-1* sometimes withholds information about economic and political events in Russia?; ELmediabias2. Do you agree that TV channel *Rossia-1* sometimes misrepresents information about economic and political events in Russia?; ELmediabias3. What is the main cause of the issue with *Rossia-1* coverage?	Binary; Ordinal low to high ([0, 1])	$\mathbb{E}[\beta \mid m_k]$; $\mathbb{E}[\beta]$	P3 and P6
ELperformancelocal. Are you satisfied with the performance of *[head of municipality/ governor of the region]* that you live in?	Binary; Ordinal low to high ([0, 1])	$\mathbb{E}[\gamma_L \mid m_k]$; $\mathbb{E}[\gamma_L]$	P4 and P6
ELperformancefed. Are you satisfied with the performance of the president of Russian Federation?	Binary; Ordinal low to high ([0, 1])	$\mathbb{E}[\gamma_C \mid m_k]$; $\mathbb{E}[\gamma_C]$	P4 and P6
BLmediabias1. Do you agree that media in Russia covers main economic and political events FULLY and CORRECTLY?; BLmediabias2. What best describes how media in Russia covers main economic and political?; BLmediabias3. What is the main cause of the issue with Russian media coverage you chose?; BLmediabias4. Which political interests does media represent primarily?	Binary; Categorical	$\mathbb{E}[\beta]$	P3 and P6

Columns in the table represents the following mapping: question id's → question wording → type of variables constructed based on collected responses → theoretical parameters measured by variables constructed → theoretical predictions. If the wording of the question was given in one of the previous tables only question id is provided in the Column 1.

Exact question and answer options wording can be found in the Section 8.3.

Table 2: Mediators from Section 3.3: Questions, Variable Construction and Corresponding Parameters

Question	Scale	Parameter	Predictions
education. What is the highest level of education you attained?	Ordinal low to high (z-score)	Citizen comprehension; Education	Citizens comprehension
BLknowsgovernor. Do you know, who is the governor of the region you reside in?; BLknowslocal. Do you know, who is the head of the municipality you reside in?; BLmediatype. How often do you learn about news in Russia and in the World from the following national media sources?	Binary; Ordinal low to high ([0, 1])	Citizen knowledge of local politics	Citizens knowledge
BLmediatype. How often do you learn about news in Russia and in the World from the following national media sources?; BLmediaview. How often do you watch news broadcasts from the following national TV channels?; BLmedialocal. How often do you learn about local news from the following media sources?	Binary; Ordinal low to high ([0, 1]); Average index ([0, 1])	Biased media exposure; Local media exposure	Media exposure
BLpolicyexposure. How often in the past 6 months did you experienced or heard from relatives about [poor service at a public hospital / bad quality of roads / natural disasters (for example, forest fires, flooding)]; BLknowsff. There were widespread naturally occurring forest fires in Siberia this year. Because of forest fires many localities were covered in smoke, including regional capitals. Did you know about theses forest fires?; BLexperienceff. Did you notice smoke from naturally occurring forest fires this summer?; BLknowsforestfiresregions. Which regions had largest areas of the forest fires this summer? Choose one or multiple answers	Binary; Ordinal low to high ([0, 1]); Average index ([0, 1])	Exposure to issues in road construction/natural disaster prevention	Prior policy exposure
locality. Please, provide the type and name of settlement you reside in	Inverse of log average distance to closest forest fires	Exposure to issues in forest fires	Geographical proximity
BLpolicypriority. Please range the following public policy issues in order of their priority in your region, where 1 – highest priority and 4 – lowest priority	Binary; Ordinal low to high ([0, 1])	Priority for road construction/natural disaster prevention	Policy importance
region. Please, choose the region of Russia you reside in	Binary	Region of residence	Difference in exposure between regions; Difference in political structure

Columns in the table represents the following mapping: question id's → question wording → type of variables constructed based on collected responses → theoretical parameters measured by variables constructed → theoretical predictions. If the wording of the question was given in one of the previous tables only question id is provided in the Column 1.
Exact question and answer options wording can be found in the Section 8.3.

Table 3: Alternative Explanations from Section 3.4: Questions, Variable Construction and Corresponding Parameters

Question	Scale	Parameter	Predictions
BLmediabias1; BLmediabias2; BLmediabias3; BLmediabias4	Binary; Ordinal low to high ([0,1])	Beliefs about selective reporting; $\mathbb{E}[\beta]$	Extreme prior beliefs about media bias; Selective reporting by media
ELroadrespblame; ELroadsatis; ELroadreason; ELroadrespcapacity; ELffrespblame; ELffsatis; ELffreason; ELffrespcapacity	Binary; Ordinal low to high ([0,1]); Average index ([0,1])	Attitudes about road construction/natural disaster prevention	Halo effects
BLscenario2negative; BLscenario2positive	Binary	Citizens attribution of responsibility	Attributing bad policy outcomes to local government
ELroadrespblame; ELroadrespcapacity; ELffrespblame; ELffrespcapacity	Binary; Ordinal low to high ([0,1]); Average index ([0,1])	Responsibility attribution for road construction/natural disaster prevention	Blame vs. capacity to change
BLgovernorlocal. Whose interests does the governor of your region primarily represent?	Binary	Perception that governor represents interests of federal government	Local government represents central government
ELperformancelocal. Are you satisfied with the performance of [head of municipality/ governor of the region] that you live in?	Ordinal low to high ([0,1]); Average index ([0,1])	Evaluation of municipal and regional government	Regional vs. municipal government

Columns in the table represents the following mapping: question id's $\rightarrow$ question wording $\rightarrow$ type of variables constructed based on collected responses $\rightarrow$ theoretical parameters measured by variables constructed $\rightarrow$ theoretical predictions. If the wording of the question was given in one of the previous tables only question id is provided in the Column 1.

Exact question and answer options wording can be found in the Section 8.3.

Table 4: Additional variables: Questions, Variable Construction and Corresponding Quantities

Question	Scale	Parameter	Check
`BLcheckattention`. Next we will show you a short (approximately 1 min.) video report and ask a couple questions about it. If you want to proceed, please choose both Red and Green below; `ELvideotopic`. Please choose two phrases that best describe the topic of the report you just watched? `Surveytime`; `Questiontime`; `Straightline`	Binary; Ordinal low to high ([0, 1]); Average index ([0, 1])	Attention to survey questions/video reports	Attention Check
`ELvideogist`. Please, in 2-3 sentences summarize the main contents of the report you just watched; `ELvideotopic`. Please choose two phrases that best describe the topic of the report you just watched?; `ELvideoeval`. How would you evaluate quality the news report?	Binary; Ordinal low to high ([0, 1]); Frequency	Information received from the video report	Manipulation Check
`ELdemandeffects`. Which of the following statements in your opinion best describes the purpose of this survey?	Binary	Perceived purpose of study	Experimenter Effects Check
`ELroadrespblame`; `ELroadrespcapacity`; `ELffrespblame`; `ELffrespcapacity`	Binary; Ordinal low to high ([0, 1])	Responsibility attribution for road construction/natural disaster prevention	Ordering effects

Columns in the table represents the following mapping: question id's → question wording → type of variables constructed based on collected responses → quantities measured by variables constructed → threat to inference checked. If the wording of the question was given in one of the previous tables only question id is provided in the Column 1.

Exact question and answer options wording can be found in the Section 8.3.

4.1 Item-level missingness

Important feature of the online survey used in this study is that, in most questions respondents were required to provide an answer to proceed with the survey. This was done to avoid high non-response rates common for online surveys, when respondents have incentives to click-through the survey.

All variables in the study will be imputed via chained equations as implemented in the `mice` package in R. Imputations will take place separately in the categories listed above. Where a category contains only one variable or where certain missing values cannot be imputed (e.g. because all items in a category are missing), mean imputation is used to eliminate the remaining missing values. To assess the robustness of the results, I will also report results based on list-wise deletion.

4.2 Construction of variables for analyses

For ease of analysis I will use the following conventions in construction of the three main types of variables mentioned in Tables 1 to 4:

- **Binary** variables will be coded with `1` representing *Yes* and `0` – representing *No*;
- **Ordinal** variables will be re-coded so that low values correspond to lower levels of corresponding parameter, and high – high levels of corresponding parameter. In addition, all ordinal variables will be scaled to $[0, 1]$ interval to closer represent parameters of the theoretical model and for ease of interpretation. I will use the following code for scaling:
  ```
  scale01 <- function(var) {( var - min(var, na.rm = T) )/(max(var, na.rm = T) - min(var, na.rm = T))}
  ```
- **Average** (mean) indexes will be calculated using mean imputation of any missing values using the following function:
  ```
  greedy_indexing <- function(vars){
    non_missing <- rowSums(!is.na(vars))
    scores <- rowSums(vars, na.rm = T)
    index <- scores/non_missing
    return(index)
  }
  ```

5 Hypotheses and estimation procedures

5.1 Main estimation procedures

This section maps the predictions of the formal model from the Theory section into the testable hypotheses and describes the procedures used to test them. I follow the Standard Operating Procedures (Lin, Green and Coppock, 2016) in the testing of proposed hypotheses in cases that are not explicitly stated below.

Let $\boldsymbol{Y}^K$ be the vector of revealed outcomes, where K indicates the outcome of interest. Let $\boldsymbol{Z}_m$ denote the vector indicating respondents who received video report(s) m. Since there was only one

round of measurement, the effect of any report(s) s compared to other report(s) l can be estimated using the following OLS specification[18]:

$$\boldsymbol{Y}^K = \alpha_l^K + \sum_{s \neq l} \tau_{s,l}^K \boldsymbol{Z}_s + \boldsymbol{\varepsilon} \left[+ \boldsymbol{X}\boldsymbol{\xi} \right], \tag{18}$$

where $\tau_{s,l}^K$ is the difference-in-means estimate of the intent-to-treat (ITT) effect of exposure to message(s) s compared to exposure to message(s) l on outcome K, or using terms in Predictions section, $\Delta_{s,l}^K$. α_l^K provides an estimate of the average outcome K among those exposed to message(s) l. Note that sets l and s in Equation (18) can represent any single news report or set of news reports in the study. E.g. using $l = m_P$ and $s = m_R$ we can estimate Δ_{m_R,m_P}^K, and using $l \in \{m_P, m_D\}$ and $s = m_R$ we can estimate $\Delta_{m_R,\{m_P,m_D\}}^K$. $\left[+ \boldsymbol{X}\boldsymbol{\xi} \right]$ represents that for robustness each model equation is essentially estimated twice, w/ and w/o set of covariates selected using lasso procedure from the set of z-scores of pre-treatment covariates described below in secton on Covariate Selection. The p-values for the tests of interest are computed using parametric HC2 standard errors implemented in `estimatr` package in `R`. Where theory registered in PAP predicts specific direction of the effect of the treatment, I calculate one-sided parametric p-values.[19]

Since some of the predictions produced by formal theoretical framework state that corresponding treatment effects are expected to be zero, I use two-tailed test based on equation (18) to see if there are grounds to believe that corresponding effects are significantly different from zero.[20]

Unless otherwise indicated, conditional ITT effects and the differences between them (heterogeneous effects) will be estimated using the following specification:

$$\boldsymbol{Y}^K = \alpha_l^K + \nu^K \boldsymbol{R} + \sum_{s \neq l} \tau_{s,l}^K \boldsymbol{Z}_s + \sum_{s \neq l} \pi_{s,l}^K \boldsymbol{Z}_s \times \boldsymbol{R} + \boldsymbol{\varepsilon} \left[+ \boldsymbol{X}\boldsymbol{\xi} \right], \tag{19}$$

where $\tau_{s,l}^K$ is the ITT effect estimate among subjects for whom $R_i = 0$, $\boldsymbol{R}$ is a vector of values of a moderator and ν^K is the associated coefficient among respondents who were assigned to receive

---

[18]This assumption simplifies the interpretation of the analyses. All models will be also estimated using ordered logit model for robustness.

[19]I plan to supplement parametric estimates of the standard errors with non-parametric randomization inference ones. For the randomization inference I will subset the dataset to the experimental conditions for which difference in means is being estimated, e.g. for Δ_{m_R,m_P}^K the permutation of treatment assignment will be conducted among those who were assigned to road construction and placebo news reports only. Alternative estimation strategy would first remove estimated effects from the treatment irrelevant for the comparison and then permute the relevant assignment vector for the whole sample in the study.

[20]To directly test the no effect predictions, in addition to commonly used assumption that failing to reject the null of non-zero effect constitutes evidence for absence of treatment effects, I plan to use more direct approach proposed by Hartman and Hidalgo (2018). Specifically I plan to conduct a hypothesis test proposed by Hartman and Hidalgo that explicitly models H_0 as positive effect above assumed ϵ threshold around zero. The main benefit of this approach is that it generates p-value that can be directly used for the family-wise error rate correction. In addition equivalence approach proposed by Hartman and Hidalgo allows us to conduct sensitivity analyses (Rosenbaum and Silber, 2009) and provide the minimal size of ϵ threshold for which we reject the null of non-zero effect of treatment.

news report(s) l. $\pi_{s,l}^K$ is the linear estimate of the change in the estimated ITT effects of report(s) s as we increase the value of moderator.

In the case of binary moderator measure $\pi_{s,l}^K$ estimates difference in the estimated ITT effects as we change from $R_i = 0$ to $R_i = 1$. In addition in this case the conditional effects will be estimated using the equation (18) on subsamples of data defined by the value of moderator $\boldsymbol{R}$.

5.2 Testable hypotheses

The testable hypotheses implied by Theoretical predictions are shown below split into five main groups: Primary outcomes, secondary outcomes, heterogeneous effects by priors on theoretical parameters, other heterogeneous effects.

Hypothesis H1 (Primary Outcomes)
The following hypotheses will be tested using Equation (18)

1. $\tau^{\rho_D}(m_D, m_P) > 0$, $\tau^{\rho_R}(m_R, m_P) > 0$,

2. $\tau^{\theta_D}(m_D, m_P) < 0$, $\tau^{\theta_R}(m_R, m_P) < 0$,

3. $\tau^{\beta}(m_D, m_P) > 0$, $\tau^{\beta}(m_R, m_P) > 0$,

4. $\tau^{\theta_D}(m_R, m_P) = 0$, $\tau^{\theta_R}(m_D, m_P) = 0$, $\tau^{\rho_D}(m_R, m_P) = 0$, $\tau^{\rho_R}(m_D, m_P) = 0$,

5. $\tau^{\theta_D}(m_D, m_R) < 0$, $\tau^{\theta_R}(m_R, m_D) < 0$, $\tau^{\rho_D}(m_D, m_R) < 0$, $\tau^{\rho_R}(m_R, m_D) < 0$.

Hypothesis H1 follow directly from the Predictions P1 to P3 and P5 except the hypothesis three, where we presume that for both policies covered in the treatment news reports citizens have fairly low prior evaluation of policy performance and are sufficiently confused about responsibility allocation ($\mathbb{E}[\theta_k] + \mathbb{E}[\rho_k] \leq 1$). This implies that the message that attributes policy responsibility to local government is likely to come from media biased in favor of the central government and thus leads to positive updating on the bias by citizens.

Hypothesis H2 (Secondary Outcomes)
The following hypotheses will be tested using Equation (18)

1. $\tau^{\gamma_L}(m_D, m_P) < 0$, $\tau^{\gamma_L}(m_R, m_P) < 0$,

2. $\tau^{\gamma_C}(m_D, m_P) > 0$, $\tau^{\gamma_C}(m_R, m_P) > 0$.

Hypothesis H2 follow directly from the Prediction P4

Hypothesis H3 (Heterogeneous Effects by Priors)
The following hypotheses will be tested using Equation (19)

1. For the heterogeneous effects with respect to prior beliefs about bias of the media ($\mathbb{E}[\beta]$):

   - $\pi^{\rho_D}(m_D, m_P) < 0$, $\pi^{\rho_R}(m_R, m_P) < 0$,
   - $\pi^{\theta_D}(m_D, m_P) < 0$, $\pi^{\theta_R}(m_R, m_P) < 0$,
   - $\pi^{\beta}(m_R, m_P) < 0$, $\pi^{\beta}(m_D, m_P) < 0$,
   - $\pi^{\gamma_C}(m_R, m_P) < 0$, $\pi^{\gamma_C}(m_D, m_P) < 0$.

2. For the heterogeneous effects with respect to prior beliefs about respective policy performance ($\mathbb{E}[\theta_k]$):

   - $\pi^{\rho_R}(m_R, m_P) > 0$, $\pi^{\rho_D}(m_D, m_P) > 0$,
   - $\pi^{\beta}(m_R, m_P) < 0$, $\pi^{\beta}(m_D, m_P) < 0$.

3. For the heterogeneous effects with respect to prior beliefs about respective responsibility allocation ($\mathbb{E}[\rho_k]$):

   - $\pi^{\theta_R}(m_R, m_P) > 0$, $\pi^{\theta_D}(m_D, m_P) > 0$,
   - $\pi^{\beta}(m_R, m_P) < 0$, $\pi^{\beta}(m_D, m_P) < 0$.

Hypothesis H3 follow directly from the Prediction P5. Note that for each policy k I expect no heterogeneous effects with respect to prior beliefs about other policy $j \neq k$.

Hypothesis H4 (Heterogeneous Effects)
The following hypotheses will be tested using Equation (19)

1. For the heterogeneous effects with respect to prior citizens comprehension:

   - $\pi^{\rho_D}(m_D, m_P) > 0$, $\pi^{\rho_R}(m_R, m_P) > 0$,
   - $\pi^{\theta_D}(m_D, m_P) < 0$, $\pi^{\theta_R}(m_R, m_P) < 0$,
   - $\pi^{\beta}(m_D, m_P) > 0$, $\pi^{\beta}(m_R, m_P) > 0$.

2. For the heterogeneous effects with respect to prior citizens knowledge of politics:

   - $\tau^{\rho_D}(m_D, m_P) > 0$, $\tau^{\rho_R}(m_R, m_P) > 0$, $\pi^{\rho_D}(m_D, m_P) < 0$, $\pi^{\rho_R}(m_R, m_P) < 0$,
   - $\tau^{\theta_D}(m_D, m_P) < 0$, $\tau^{\theta_R}(m_R, m_P) < 0$, $\pi^{\theta_D}(m_D, m_P) > 0$, $\pi^{\theta_R}(m_R, m_P) > 0$,
   - $\tau^{\beta}(m_D, m_P) > 0$, $\tau^{\beta}(m_R, m_P) > 0$, $\pi^{\beta}(m_D, m_P) < 0$, $\pi^{\beta}(m_R, m_P) < 0$.

3. For the heterogeneous effects with respect to prior exposure to TV (as opposed to Internet-based) news sources:

   - $\pi^{\rho_D}(m_D, m_P) > 0$, $\pi^{\rho_R}(m_R, m_P) > 0$,
   - $\pi^{\theta_D}(m_D, m_P) < 0$, $\pi^{\theta_R}(m_R, m_P) < 0$,
   - $\pi^{\beta}(m_D, m_P) > 0$, $\pi^{\beta}(m_R, m_P) > 0$.

4. For the heterogeneous effects with respect to prior local media exposure:

- $\tau^{\rho_D}(m_D, m_P) > 0$, $\tau^{\rho_R}(m_R, m_P) > 0$, $\pi^{\rho_D}(m_D, m_P) < 0$, $\pi^{\rho_R}(m_R, m_P) < 0$,
- $\tau^{\theta_D}(m_D, m_P) < 0$, $\tau^{\theta_R}(m_R, m_P) < 0$, $\pi^{\theta_D}(m_D, m_P) > 0$, $\pi^{\theta_R}(m_R, m_P) > 0$,
- $\tau^{\beta}(m_D, m_P) > 0$, $\tau^{\beta}(m_R, m_P) > 0$, $\pi^{\beta}(m_D, m_P) < 0$, $\pi^{\beta}(m_R, m_P) < 0$.

5. *For the heterogeneous effects with respect to prior policy exposure:*

- $\tau^{\rho_D}(m_D, m_P) > 0$, $\tau^{\rho_R}(m_R, m_P) > 0$, $\pi^{\rho_D}(m_D, m_P) < 0$, $\pi^{\rho_R}(m_R, m_P) < 0$,
- $\tau^{\theta_D}(m_D, m_P) < 0$, $\tau^{\theta_R}(m_R, m_P) < 0$, $\pi^{\theta_D}(m_D, m_P) > 0$, $\pi^{\theta_R}(m_R, m_P) > 0$,
- $\tau^{\beta}(m_D, m_P) > 0$, $\tau^{\beta}(m_R, m_P) > 0$, $\pi^{\beta}(m_D, m_P) < 0$, $\pi^{\beta}(m_R, m_P) < 0$.

6. *For the heterogeneous effects with respect to geographical proximity to forest fires:*

- $\tau^{\rho_D}(m_D, m_P) > 0$, $\pi^{\rho_D}(m_D, m_P) < 0$,
- $\tau^{\theta_D}(m_D, m_P) < 0$, $\pi^{\theta_D}(m_D, m_P) > 0$,
- $\tau^{\beta}(m_D, m_P) > 0$, $\pi^{\beta}(m_D, m_P) < 0$.

7. *For the heterogeneous effects with respect to prior evaluation of importance of road construction/natural disaster prevention:*

- $\pi^{\rho_D}(m_D, m_P) > 0$, $\pi^{\rho_R}(m_R, m_P) > 0$,
- $\pi^{\theta_D}(m_D, m_P) < 0$, $\pi^{\theta_R}(m_R, m_P) < 0$,
- $\pi^{\beta}(m_D, m_P) > 0$, $\pi^{\beta}(m_R, m_P) > 0$.

8. *For the heterogeneous effects with respect to indicator for regions that had forest fires within their territory:*

- $\pi^{\rho_D}(m_D, m_P) > 0$,
- $\pi^{\theta_D}(m_D, m_P) < 0$,
- $\pi^{\beta}(m_D, m_P) > 0$.

9. *For the heterogeneous effects with respect to indicator for regional politics being captured by central government:*

- $\pi^{\rho_D}(m_D, m_P) > 0$, $\pi^{\rho_R}(m_R, m_P) > 0$,
- $\pi^{\theta_D}(m_D, m_P) < 0$, $\pi^{\theta_R}(m_R, m_P) < 0$,
- $\pi^{\beta}(m_D, m_P) > 0$, $\pi^{\beta}(m_R, m_P) > 0$.

Hypothesis H4 follow directly from the predictions stated in Sub-group and heterogeneous effects. Note, that I also plan to test a number of hypotheses about updating on competence of respective levels of government implied by expected updating on primary outcomes stated in Hypothesis H4.

In case if I don't find support for Hypotheses H1 to H3 I will also test hypotheses implied by Alternative explanations considered in the respective section.

5.3 Covariate selection

I will use lasso regression to select the minimal number of covariates that best predict each outcome, and include only these in our estimation. The pool of covariates includes all covariates available, that are not mentioned in the Sections 3.3 and 3.4 and **??**: `age`, `locality_type`, `income`, `female`, and a number of statistics collected by *EnjoySurvey* platform.

The lasso procedure that I plan to use features a generalized linear model with lasso penalization, and is implemented in the `glmnet` package in `R`. The loss function requires selecting a regularization parameter, λ, that determines the severity of the penalty for including extra covariates. Since this regularization parameter cannot be optimally chosen in advance, we will select it using 10-fold cross-validation.

Specifically, for each outcome, we choose the λ that minimizes the 10-fold cross-validation error averaged over 10 runs (since the folds are chosen at random). Only the covariates retained by the lasso will be included in the specification. In other words, for each outcome, the dimentionality of matrix $\boldsymbol{X}$ in Equation (18) can vary based on the number of covariates selected by the procedure. We will perform this lasso variable selection method using the entire pool of covariates that are listed in the Table 2.

6   Threats to inference

6.1 Randomization

Since the simple random assignment procedure is implemented using the following `PHP` code on the online survey platform *EnjoySurvey*

```php
$arr=[0,1,2];
shuffle($arr);
$ans=array_shift($arr);
$q->answer($ans);
$q->next();
```

While this code is syntactically correct, I perform additional check of randomization procedure using randomization inference χ^2 test in `R` with 10000 permutations on the sample of subjects who reached random assignment stage of the survey (right before respective treatment being administered)

```r
set.seed(12231987)

obs <- chisq.test(table(sibtv$Rvideo))$statistic

sims <-
  pbapply::pbreplicate(10^5, expr = {
    chisq.test(table(sample(1:3, nrow(sibtv), replace = TRUE)))$statistic
  })
```

Given that the study included three simple random assignment procedures–three video reports, two different wordings of scenario, and random order of policies in responsibility section–I use

relevant indicators to conduct the same test of randomization procedure validity replacing `Rvideo`, `Rscenario` and `Rrespgroup` respectively and adjusting the number of conditions. If we reject null hypothesis of group membership being assigned with equal probabilities, the results of the experiment should be taken with caution. I will treat this as a reason to pay additional attention to imbalances of treatment assignment with respect to covariates.

6.2 Placebo control effects

While it is unlikely that placebo reports used in this study shift perceptions of the policy responsibility, performance and government competence, it is possible that citizens change their perception of media outlet bias as a result of exposure to news report from that outlet not related to economic or political issues. Given that the experiment featured only one wave of survey it is generally impossible to test whether respondents exposed to placebo media report change their evaluation of media bias.

That said I plan to use pre-treatment evaluation of overall media bias (question `BLmediabias1`–`BLmediabias4`) and compare it to endline evaluation of bias of the specific media outlet (questions `ELmediabias1`–`ELmediabias3`) among those who were exposed to placebo reports. I will use simple OLS specification and regress post-treatment media bias evaluations on pre-treatment ones subsetting to placebo control group. Absence of significant relationship between pre- and post-treatment media bias evaluation will serve as a strong evidence in favor of no effect of placebo report. This test is imperfect since there are reasons to believe that the *Rossia-1* channel could be perceived as more biased in favor of federal government than overall media environment in Russia.

6.3 Attention check

Measurement of attitudes on the sample of online panelists, like the one used in this project, oftentimes raises concern that respondents do not pay attention to the survey questions and thus the measurement becomes unreliable.

To address this issue the online survey instrument featured a number of automated and explicit attention checks that allow me to measure respondent's attention. First, survey instrument included simple question (`BLcheckattention`) that asked respondents to choose specific combination of answers prior to showing of experimental news reports. In addition, *EnjoySurvey* platform used in the study also automatically collects a number of measures like `Surveytime`, `Questiontime` and `Straightline`, which indicate whether respondent goes through the questionnaire at an unusually high speed and whether respondent always chooses responses that are presented in the same position on the screen in multiple choice questions. I plan to use these automated checks collected prior to the treatment assignment to supplement the attention measurement based on `BLcheckattention` question. I plan to combine all measures of attention into an overall mean index and use this measure as main attention check variable, `BLattention`. I will also use the measure based on `BLcheckattention` question for robustness check.

Inattention might imply that measurement of respondents' attitudes across all experimental groups is less reliable and thus the estimates of effects of exposure to news coverage will underestimate the actual effects that news coverage has on citizens beliefs. Given that attention of respondents is checked prior to the assignment of the treatment, I plan to test whether the effects of the treatment differ between those who passed the attention check and those who did not. I will use model in equation (19) and the attention check measure to test for treatment effect heterogeneity with respect to attention paid by the respondent. p-value of 0.05 or higher produced by the two-tailed test of no heterogeneous effect of treatment on outcome K by respondents attentiveness ($\pi^K = 0$) will be interpreted as an evidence for reliability of overall estimates of the treatment effect. If the test produces a p-value below 0.05, I will rely on estimates among those who passed attention check for substantive interpretation of the results.

Inattentiveness of respondents might also pose threat to the inferences if the it is not equally distributed across main experimental groups. To address this concern, I will include attention check measures in the list of covariates for which we check treatment balance. I will conclude that attention rates do not undermine inference if the balance checks are passed for the whole set of covariates listed in Balance on Covariates section.

6.4 Manipulation checks

Compliance in the context of this study can be defined as either *receipt of the news report by subject* or as *receipt of specific information contained in the reports administered to subject.* Post-treatment section of survey instrument that asks news report comprehension questions provide useful tools to analyze which information subjects picked up from the news reports and how did they perceive them.

Specifically the following question answers can be used to identify the information respondents recall from the reports they were exposed to:

- `ELvideogist` Please, in 2-3 sentences summarize the main contents of the report you just watched
- `ELvideotopic` Please choose two phrases that best describe the topic of the report you just watched?
- `ELvideoeval` How would you evaluate quality the news report?

I use the above questions first to check the possible differences in quality and comprehension of video reports across all experimental groups. This will entail use simple text analysis tools on corpus of responses to `ELvideogist` to assess any systematic differences in number of words, and number of words related to topic of the report used in the gists. In addition, I will use `ELvideoeval` to assess whether any of the video reports used was systematically perceived as having worse quality or being less informative. I will perform simple manipulation checks by estimating equation (18) using respective compliance measures as outcome variables.

I will also conduct additional manipulation checks using the duration statistics collected by *EnjoySurvey* platform to assess the average time spent by respondents while watching video report and answering any of the questions about video report contents.[21] I will use average time spent on video and post-video questions as dependent variable in equation (18) to identify any systematic differences between experimental conditions.

Second, I will use `ELvideogist` and `ELvideotopic` identify respondents who likely understood the main treatment reports in the way consistent with the theoretical framework, i.e. respondents who mention responsibility allocation and relevant government levels in their summary and select respective topics. These measures combined will allow me to create an indicator for the compliance with the treatment that can be used to estimate compliers average causal effect (*CACE*) using instrumental variable approach with second stage resembling equation (18) if the manipulation checks do not identify any systematic differences in perception of videos in other respects beyond the topic of the video.

For the open-ended question that asked to provide a gist of video I use simple 1-gram frequency tables generated using `ngram` package in `R` to identify the most frequent keywords appearing in the gists provided by respondents in one of the experimental conditions. I then construct a variable percentage of keywords used that appear with frequency above or equal to 0.01[22] in summaries for each respective news report and use these variables to conduct the manipulation checks.

Given that I cannot credibly claim that perception of quality of the videos, duration statistics, or mentioning relevant terms in the gist or in selected topics are the only channels through which watching videos affects main outcomes of interest in the study, the estimates of *CACE* using the measures of compliance above will serve as additional evidence rather than main evidence for the effects of the treatment video reports.

6.5   Attrition

To assess the level of attrition I will construct an indicator for respondents who do not have responses to some or all of the post-treatment questions.

I will conduct two tests to assess whether attrition is related to treatment and whether the relationship between baseline covariates and attrition varies across experimental groups:

1. I will conduct a two-tailed unequal-variances t-test of the hypothesis that treatment does not affect the attrition rate among main households and among neighbors. I will conduct this test using randomization inference, i.e. I will compare the observed t-statistic to the distribution of t-statistics under random assignment of treatment using the simple random assignment.

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[21] The outliers are censored at 95% percentile.

[22] Here $B = \dfrac{\mathbb{E}[\rho_k](1 - 2\,\mathbb{E}[\theta_k])}{\mathbb{E}[\rho_k](1 - 2\,\mathbb{E}[\theta_k]) + 2\,\mathbb{E}[\theta_k](1 - \mathbb{E}[\theta_k])}$. Note that $\dfrac{\partial B}{\partial\,\mathbb{E}[\rho_k]} \geq 0$ and $\dfrac{\partial B}{\partial\,\mathbb{E}[\theta_K]} \leq 0$ which implies that the range in which blame-shifting by central government is possible shrinks as the *a priori* beliefs about policy performance improves, but increases in the prior attribution of responsibility to local government.

2. I will regress an attrition indicator on treatment, a set of baseline covariates, and treatment-covariate interactions. The set covariates that will be used for this test includes: `region`, `locality_type`, `BLmediatype_tv`, `BLmediaview_federal_ind`, `BLmediabias`, `BLmediabias_misreport`, `BLpolicyexposure_ind`, `BLvalueslocal_ind`, `BLscenario_local_ind`, `BLattention`. This list contains pre-treatment measurements of media viewership, bias, policy exposure, value for local issues and responsibility attribution to local government as well as respondents region and locality type (urban vs. rural). While these measures do not correspond directly the outcomes of interest prior to the treatment, they correspond closely to those outcomes. I will perform an *F*-test of the hypothesis that all the treatment-by-covariate interaction coefficients are zero. Again, I will rely on randomization inference to conduct this test.

If none of the tests produces a *p*-value smaller than 0.05, I will report naive estimates among the respondents for whom I have obtained outcome data. Additionally, I will assess the robustness of the results by reporting extreme value bounds. If one of these tests produces a *p*-value smaller than 0.05 for main respondents or neighbors, I will rely on an extreme value bounds approach.

6.6 Social desirability bias

In order to get a sense of the extent to which treatment-related experimenter demand effects may drive the results, I will ask respondents in the end of survey whether they can guess the main aim of the study. The `ELdemandeffects` question in the survey includes the main experimental question as one of the options respondent can choose. I plan to look at the differences in rates of choosing this specific option across experimental groups using indicator of whether relevant option was chosen in question `ELdemandeffects` as an outcome. I will test the null hypothesis of no effect of any media report on likelihood of guessing aim of the study using equation (18) and two-tailed *p*-value. Three possible outcomes of this test will are as follows:

- Significant positive effect of exposure to road construction and/or forest fires reports on likelihood of correctly guessing aim of the study will serve as an evidence of experimenter demand effects;
- Negative significant effect will suggest reverse experimenter demand effects which, if anything, will imply that the main results of the study might underestimate actual effects of reports that cover policy responsibility;
- Failure to reject null of no effect will serve as evidence of absence of experimenter demand effects in the study.

6.7 Balance on covariates

To see whether there are grounds to believe that estimated treatment effects might reflect pre-treatment characteristics of respondents in the study I will examine balance on observable covariates measured prior to the exposure to any news reports. For each covariate, I test for a significant

relationship to one of the treatment indicators using randomization inference. I do so by estimating equation (18) using one of the covariates in Tables 2 and 3 as dependent variables and including only treatment indicators in the RHS. I repeat the same procedure 2000 times to generate a randomization distribution and test sharp null of no relationship between covariate and treatment assignment. Under independence, in expectation $k\%$ of the covariates should exhibit imbalance that is significant at the $k\%$ level of significance. I will use 5% level of significance and will conclude that we observe no significant imbalances as long as 5 or less percent of covariates exhibit significant correlation with assignment to one of the experimental groups.

7 Omnibus tests of theoretical predictions

I plan to use the non-parametric simulation based family-wise error rate approach proposed by Caughey, Dafoe and Seawright (2017) to provide the summary of evidence in favor of the theory proposed in Theoretical Predictions. I will use Fisher's product function to combine p-values from partial tests. Each set of partial hypotheses in Hypotheses H1 to H3 is separately tested using the non-parametric combination approach. I also plan to pool theories of direct and heterogeneous effects on primary outcomes for joint test using the same algorithm. These joint tests while less powered might provide a more systematic evidence in favor or against the theory of Bayesian updating on responsibility attribution proposed in the study.

The algorithm outlined in Caughey, Dafoe and Seawright (2017, p. 694) applied to this study is as follows

1. Calculate the vector of observed test statistics corresponding to the J individual (partial) tests that are implied by the theory. In the case of theory outlined above we compute estimates as described in equations (18) and (19) that correspond to a single theory. In addition I calculate test statistic proposed by Hartman and Hidalgo (2018) for no effect hypotheses.

2. For each n in $\{1, \ldots, N\}$ repeat the following:

   (a) Randomly permute the experimental group labels of units within blocks to create new vector of treatment Z_n,

   (b) Calculate the vector of J observed test statistics analogous to Step 1 using Z_n instead of observed Z.

3. Presuming that the partial test statistics are expected to be large in the alternative, calculate vector of p-values corresponding to each partial test for the test statistics from Step 1 using function $p(t) = \frac{\sum_{n=1}^{N} \mathbb{1}_{T_n \geq t}}{N}$, where t represents observed test statistic, while T_j represents corresponding t-statistic from one of the Step 2 simulations.

4. Using analogous to Step 3 procedure generate vectors of p-values for partial tests for each of N simulations computed at Step 2.

41

5. Using combining function $\psi_p = -2\sum_{j=1}^{J} \log(p_j)$, combine the vector of J estimated significance levels into a global test statistic τ, which captures the observed divergence from the null across all partial tests. Then calculate the analogous statistic, T_n for each of N permutations from Step 2.

6. Estimate the combined significance level (p-value) of the global test using $p(\tau) = \frac{\sum_{n=1}^{N} \mathbb{1}_{\mathrm{T}_n \geq \tau}}{N}$.

8   Appendix

8.1   Experimental news reports

8.1.1   Natural disaster (*D*) report
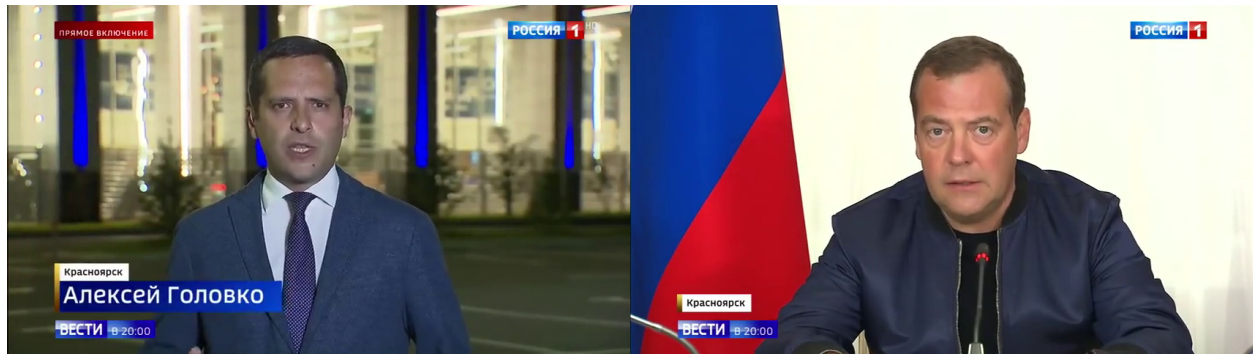
Figure 5: Screenshots from the forest fires report: Correspondent Alexey Golovko – on the left, Prime Minister Dmitry Medvedev – on the right

BROADCASTER: About two hours ago Dmitry Medvedev arrived to Krasnoyarsk and immediately at the airport he held a meeting on the situation with forest fires and the coordination of all who are now involved in their extinguishing. On a direct connection from Krasnoyarsk our correspondent Alexey Golovko. Hello, Lesha. First of all, what measures were discussed and what is the current situation?

CORRESPONDENT: Good evening colleagues, indeed the situation remains tense. That is why Dmitry Medvedev on his way to Chita made a stop here in Krasnoyarsk and held a meeting in the airport building dedicated to fighting forest fires in the Siberian Federal District.

MEDVEDEV: The main task is to prevent the spread of fire to settlements. ***I draw the attention of all regional leaders, as well as heads of municipalities. This is your responsibility, because the forest fires have to be put down here, and not from the windows of the Ministry of Emergency Situations or the Ministry of Natural Resources.***

CORRESPONDENT: Dmitry Medvedev instructed all the results of today's meeting in the form of documents-instructions to be completed by the next morning, when he will arrive to Chita where he will hold a meeting on fighting forest fires in the Far Eastern Federal District. Colleagues?

BROADCASTER: Alexey, thank you. Directly from Krasnoyarsk was reporting Alexey Golovko.

8.1.2 Roads (R) report

Figure 6: Screenshots from the road construction report: Correspondent Denis Davidov – on the left, Prime Minister Dmitry Medvedev – on the right

CORRESPONDENT: Roads are not just the Russian problem - they are real misfortune, which found reflected even in the literature, and it cannot be solve for centuries. So it is not surprising that "safe and high-quality roads" is a separate national project which is being discussed at the highest levels of government. *[change of frame]* The regional leaders are delaying the implementation of the national project had to get nervous. 106 billion rubles are allocated, it's time to sign contracts, but local representatives slow things down. The central government threatens to redistribute funds: they will be taken away from sluggish and sent to those actively constructing roads.

MEDVEDEV: *I would like all regional leaders to hear this: curators of national projects have the right to redistribute funds. And they will do it.*

CORRESPONDENT: Municipal, and most importantly, remote rural roads are often impossible to pass passing. A fifth of all funds of national projects is allocated to roads construction and repairs; Together, federal and regional budgets will spend more than 4.5 trillion rubles. Denis Davydov, Irina Vinogradova, Irina Kharlamova, Julia Shchedrova, Victor Vinogradov and Konstantin Rodin for Vesti broadcast.

8.1.3 Placebo (P) report

Figure 7: Screenshots from the placebo report: Broadcaster – on the left, Director Vladimir Menshov – on the right

BROADCASTER: Vladimir Menshov turns 80 today. It's hard to believe that the director shot only 5 movies, but any of them–"Moscow Doesn't Believe in Tears", "Raffle", "Love and Pigeons"– each captures the heart and is an inexhaustible source of catchphrases.

CORRESPONDENT: *[scene from the movie "Happy Kukushkin"]* This is 1970s, after the Moscow Art Theater School and Roma's workshop at the VGIK. Script by Menshov, main role by Menshov–this is now for life together–writing, acting, directing. And the first full feature by Menshov will become, as some say, the cult film of the 70s, "Raffle". *[Scene from the movie "Raffle"]* The author of the famous "This is me a locksmith", among other things - the prosecutor of the Shakhnazarov's "city Zero", and an outraged dad in the "Courier". *[scene from the movie "Courier"]*

MENSHOV: I always believe till the very end that a person can improve.

CORRESPONDENT: Students of VGIK will soon learn about this quality of Menshov: Director starts a new workshop here soon. Ilya Filippov, Pavel Miller, Ivan Ponomarenko, Valeria Popova, Elena Venoshina for Vesti broadcast.

8.2 Information sheet for online survey

Dear Respondent:

You are invited to participate in a phone survey conducted by agency "OMI" in collaboration with Columbia University in the City of New York (New York, USA) for scholarly study titled "Public Attribution of Responsibilities in Russia" (IRB Protocol #IRB-AAAR9146) and devoted to recent events in your region. The survey will include a short video (up to 1 minute long) and should take approximately 20 minutes to complete.

PARTICIPATION AND BENEFITS *Your participation in the survey is completely voluntary. You may refuse to participate in the survey or exit it at any time without any penalties. However, you will receive full monetary compensation from "OMI" agency for your participation only if you complete this survey and answer all of its questions.*

CONFIDENTIALITY *The authors of the study will use all the information obtained during the surveys only in an aggregated form. Columbia University IRB and the US Office of Human Research Protections may obtain access to de-identified data collected during the surveys.*

RISKS *Your participation in the survey does not involve any additional risks for you other than those encountered in day-to-day life.*

CONTACT *If you have questions about the procedures used in this study, you may contact its authors by sending an email with the title "Research Siberia" to Georgiy Syunyaev at g.syunyaev@columbia.edu or Timothy Frye at tmf2@columbia.edu. If you have any questions about your rights or responsibilities as a research participant, please contact the Columbia University Human Research Protection Office at: Phone +1 212-851-7040; Email askirb@columbia.edu.*

ELECTRONIC CONSENT *By clicking "Agree" button below, you confirm that you have heard and agree to the terms of the survey above and allow the authors of the survey to use your responses in a de-personalized and aggregated form.*

8.3 Online Survey Instrument

First, we would like to ask some questions about you...

age. *[Only respondents 18 y.o. or older will be allowed to proceed with the survey]* How old are you?

1) _____ *[Type number]*

region. *[Only respondents who reside in Kemerovo, Novosibirsk, Irkutsk and Krasnoyarsk regions will be allowed to proceed with the survey]* Please, choose the region of Russia you reside in

1) *[List of regions]*

locality. Please, provide the type and name of settlement you reside in

1) City *[Type name]*
2) Village *[Type name]*
3) Urban-type settlement *[Type name]*

Next, we will ask several questions about your media consumption...

BLmediatype. How often do you learn about news in Russia and in the World from the following national media sources?

a) TV channels
b) Radio
c) Newspapers
d) Internet news portals
e) Social Networks and channels in messengers

1) Almost every day or every day
2) Every week
3) Sometimes
4) Never or almost never

BLmediaview. How often do you watch news broadcasts from the following national TV channels?

a) Perviy Kanal *[channel logo]*
b) Rossia-1/ Rossia-24 *[channel logo]*
c) Dozhd *[channel logo]*
d) RBC *[channel logo]*
e) NTV *[channel logo]*
f) Euronews *[channel logo]*

1) Almost every day or every day
2) Every week
3) Sometimes
4) Never or almost never

BLmedialocal. How often do you learn about local news from the following media sources? [The list of media sources depends on the region, where respondent resides according to Q1]

- Kemerovo region
  a) TV channel *Vesti-Kuzbass* (on channel *Rossia-1*) *[logo]*
  b) TV channel *Kuzbass 24* (on channel *STS*) *[logo]*
  c) Internet portal vse42.ru *[logo]*
  d) Internet portal sibdepo.ru *[logo]*
  e) Newspaper *Kuzbass [logo]*
  f) Newspaper *Komsomol'skaya pravda–Kemerovo [logo]*
- Novosibirsk region
  a) TV channel *Vesti* (on channel *Rossia-1*) *[logo]*
  b) TV channel *Novosibirskie Novosti [logo]*
  c) Internet portal tayga.info *[logo]*
  d) Internet portal ngs.ru *[logo]*

     e) Newspaper *Kommersant–Novosibirsk [logo]*

     f) Newspaper __ Komsomol'skaya pravda –Novosibirsk__ *[logo]*

- Irkutsk region

     a) TV channel *Vesti-Irkutsk* (on channel *Rossia-1*) *[logo]*

     b) TV channel *Bratskaya Studia Televidenia [logo]*

     c) Internet portal irkutskmedia.ru *[logo]*

     d) Internet portal irk.ru *[logo]*

     e) Newspaper __ Komsomol'skaya pravda – Irkutsk__ *[logo]*

     f) Newspaper *Vostochno-Sibirskaya Pravda [logo]*

- Krasnoyarsk region

     a) TV channel " Vesti Krasnoyarsk" (on channel *Rossia-1*) *[logo]*

     b) TV channel *TVK [logo]*

     c) Internet portal sibnovosti.ru *[logo]*

     d) Internet portal newslab.ru *[logo]*

     e) Internet portal prmira.ru *[logo]*

     f) Newspaper __ Komsomol'skaya pravda –Krasnoyarsk__ *[logo]*

     g) Newspaper *Nash Krasnoyarskiy Krai [logo]*

1) Almost every day or every day
2) Every week
3) Sometimes
4) Never or almost never

`BLmediabias1.` Do you agree that media in Russia covers main economic and political events FULLY and CORRECTLY?

1) Yes, I agree
2) No, I disagree

`BLmediabias2.` *[Only show if in (BLmediabias1) options 2) was chosen]* What best describes how media in Russia covers main economic and political?

1) NOT FULLY, omits some events
2) NOT CORRECTLY, misrepresents some events

`BLmediabias3.` *[Only show if in (BLmediabias1) option 2) was chosen]* What is the main cause of the issue with Russian media coverage you chose?

1) Insufficient financing
2) Low qualification of the journalists
3) Capture by the large business interests
4) Capture by the political interests
5) Other *[Type your answer]*

`BLmediabias4.` *[Only show if in (BLmediabias3) options 4) was chosen]* Which political interests does media represent primarily?

1) Local/municipal government
2) Regional government
3) Federal government

Now we want to ask you a couple of questions about politics...

`BLknowsgovernor.` Do you know, who is the governor of the region you reside in?

1) Alexander Uss *[picture]*
2) Sergey Sokol *[picture]*
3) Sergey Tsivilev *[picture]*
4) Andrey Travnikov *[picture]*
5) Vyacheslav Petrov *[picture]*
6) Sergey Levchenko *[picture]*
7) Andrey Shimkiv *[picture]*

8) Dmitriy Sviridov *[picture]*
9) Igor Kobzev *[picture]*
10) Not sure

BLknowslocal. Do you know, who is the head of the municipality you reside in?

1) Yes, I do *[Type name]*
2) No, I don't

BLvalueslocal. Please, choose the statement you agree with the most

1) Government should focus more on local and regional problems
2) Government should focus more on problems of the country as a whole

BLgovernorlocal. Whose interests does the governor of your region primarily represent?

1) Residents of the region
2) Business elites within the region
3) Business elites outside the region
4) Federal government
5) Other *[Type your answer]*

BLscenario1. Consider following scenario: *Federal government as a part of education campaign allocated funding for building 20 new schools in region X. Regional government used this funding to hire a subcontractor which built 20 modern school buildings in a very short time.* Which level of government should receive most credit for building of new schools?

1) Federal government, that allocated the funding
2) Regional government, that effectively supervised the project implementation

BLscenario2negative. Now consider another scenario: *According to the law, public hospitals repair in the region X are financed from the regional budget. Due to budget deficit, governor of region X requested funding for repairs of 30 hospitals in the region from the federal government. Federal government decided not to allocate additional funding and 30 hospitals in the region remained in emergency state.* Which level of the government is most to blame for the state of public hospitals in the region?

1) Federal government, which did not provide additional funding
2) Regional government, ineffectively manages regional budget

BLscenario2positive. Now consider another scenario: *According to the law, public hospitals repair in the region X are financed from the regional budget. Due to budget deficit, governor of region X requested funding for repairs of 30 hospitals in the region from the federal government. Federal government allocate additional funding and 30 hospitals in the region were repaired.* Which level of the government is most to responsible for repairing public hospitals in the region?

1) Federal government, which provided additional funding
2) Regional government, which requested funding and monitored implementation

BLpolicypriority. Please range the following public policy issues in order of their priority in your region, where 1 – highest priority and 4 – lowest priority

1) Education (e.g. construction/repair of schools and kindergartens)
2) Infrastructure (e.g. road construction and repair)
3) Healthcare (e.g. hospital construction and repair)
4) Environmental protection (e.g. natural disasters prevention and relief)

BLpolicyexposure. How often in the past 6 months did you experienced or heard from relatives about [**poor service at a public hospital / bad quality of roads / natural disasters (for example, forest fires, flooding)**]?

1) Each week or more often
2) Roughly each month
3) Once or twice
4) Never

BLknowsff. There were widespread naturally occurring forest fires in Siberia this year. Because of forest fires many localities were covered in smoke, including regional capitals. Did you know about theses forest fires?

1) Yes, I knew about the forest fires
2) No, I did not know about the forest fires

BLexperienceff. *[Only show if in (BLknowsff) options 1) was chosen]* Did you notice smoke from naturally occurring forest fires this summer?

1) Yes, the smoke was visible for a long time
2) Yes, but the smoke was visible only a couple days
3) No, I did not notice any smoke

BLknowsforestfiresregions. Which regions had largest areas of the forest fires this summer? Choose one or multiple answers

1) Novosibirsk region
2) Omsk region
3) Krasnoyarskiy krai
4) Buryatiya republic
5) Irkutsk region
6) Kemerovo region

BLcheckattention. Next we will show you a short (approximately 1 min.) video report and ask a couple questions about it. If you want to proceed, please choose both *Red* and *Green* below

1) Red
2) Blue
3) Green
4) Yellow

***Please, watch the following news report from* Vesti *on channel* Rossia-1*:**

(Placebo group):

- News report from *Vesti* about birthday of an actor

(Roads group):

- News report from *Vesti* about road infrastructure issues in Russia mentioning governors responsibilities

(Forest Fires group):

- News report from *Vesti* about natural forest fires in Russia mentioning governors responsibilities

ELvideogist. Please, in 2-3 sentences summarize the main contents of the report you just watched

1) *[Type your answer]*

ELvideotopic. Please choose two phrases that best describe the topic of the report you just watched?

1) Federal authorities
2) Education
3) Local/Municipal authorities
4) Road repairs and construction
5) Healthcare
6) Regional authorities
7) Cultural events
8) Environmental/Natural Disaster

ELvideoeval. How would you evaluate quality the news report?

1) Bad, not informative and poorly edited
2) Medium, fairly informative and fairly well edited
3) Good, very informative and well edited

Next we will ask you a couple of questions about your attitudes towards redistribution of wealth in society...

ELredistrbudget. Which share of collected taxes should remain at the regional level and which share should be transferred to federal center to potentially be returned to regions at the federal government discretion?

1) 10% to regions / 90% to federal center
2) 20% to regions / 80% to federal center
3) 30% to regions / 70% to federal center
4) 40% to regions / 60% to federal center
5) 50% to regions / 50% to federal center
6) 60% to regions / 40% to federal center
7) 70% to regions / 30% to federal center
8) 80% to regions / 20% to federal center
9) 90% to regions / 10% to federal center

ELredistratt. Do you agree with the following statement: *For a society to be fair, the government should reduce differences in the socio-economic conditions of people*

1) Strongly agree
2) Agree
3) Neither agree, nor disagree
4) Disagree
5) Strongly disagree

ELredistrtarget. Which three of the following groups of citizens deserve support from the government the most?

1) Retired
2) Disabled
3) Veterans
4) Families with children
5) Natural disaster victims
6) Poor
7) Unemployed
8) Other *[Type your answer]*

ELlocuscontrol. Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please use this scale where 1 means *no choice at all* and 10 means *a great deal of choice* to indicate how much freedom of choice and control you feel you have over the way your life turns out

1) 1 – No choice at all
2) 2
3) 3
4) 4
5) 5
6) 6
7) 7
8) 8
9) 9
10) 10 – A great deal of choice

***Next few questions will be about about the TV channel* Rossia-1...**

ELmediabias1. Do you agree that TV channel *Rossia-1* sometimes withholds information about economic and political events in Russia? 1) Strongly agree 2) Agree 3) Disagree 4) Strongly disagree

ELmediabias2. Do you agree that TV channel *Rossia-1* sometimes misrepresents information about economic and political events in Russia?

1) Strongly agree
2) Agree
3) Disagree
4) Strongly disagree

ELmediabias3. *[Only show if in either (ELmediabias1) or (ELmediabias2) option 4) was NOT chosen]* What is the main cause of the issue with *Rossia-1* coverage?

   1) Insufficient financing
   2) Low qualification of the journalists
   3) Capture by the large business interests
   4) Capture by the political interests
   5) Other *[Type your answer]*

Next block of questions will ask about the locality you live in...

ELsatisoverall. In general, are you satisfied with the state of affairs in your locality?

   1) Very satisfied
   2) Satisfied
   3) Unsatisfied
   4) Very unsatisfied

ELroadrespblame. Please rank the following levels of government in Russia in the order of their **responsibility (in terms of blame and credit) for the current** quality of roads where you live?

   1) Local officials including the head of municipality
   2) Regional officials including the governor of the region
   3) Federal officials including the president

ELroadsatis. Are you satisfied with the quality of roads where you live?

   1) Very satisfied
   2) Satisfied
   3) Unsatisfied
   4) Very unsatisfied

ELroadgist. *[Only show if in (ELroadsatis) options 2), 3) or 4) were chosen]* Summarize in short what are the main problems of roads in your locality?

   1) *[Type your answer]*

ELroadreason. *[Only show if in (ELroadsatis) options 2), 3) or 4) were chosen]* What are the main reasons for issues with roads in your locality?

   1) Insufficient public financing
   2) Ineffective spending of public funds
   3) Poor monitoring by officials
   4) Other *[Type your answer]*

ELroadrespcapacity. Please rank the following levels of government in Russia in the order of their **capacity to change** quality of roads where you live?

   1) Local officials including the head of municipality
   2) Regional officials including the governor of the region
   3) Federal officials including the president

ELffrespblame. Please rank the following levels of government in Russia in the order of their **responsibility (in terms of blame and credit) for the current** natural disasters prevention and relief measures where you live?

   1) Local officials including the head of municipality
   2) Regional officials including the governor of the region
   3) Federal officials including the president

ELffsatis. Are you satisfied with natural disasters (e.g. forest fires) prevention and relief where you live?

   1) Very satisfied
   2) Satisfied

3) Unsatisfied

4) Very unsatisfied

ELffgist. *[Only show if in (ELffsatis) options 2), 3) or 4) were chosen]* Summarize in short what are the main problems of natural disasters (e.g. forest fires) prevention and relief in your locality?

1) *[Type your answer]*

ELffreason. *[Only show if in (ELffsatis) options 2), 3) or 4) were chosen]* What are the main issue with natural disaster prevention in your locality?

1) Insufficient public financing

2) Ineffective spending of public funds

3) Poor monitoring by officials

4) Other *[Type your answer]*

ELffrespcapacity. Please rank the following levels of government in Russia in the order of their **capacity to change** natural disasters prevention and relief measures where you live?

1) Local officials including the head of municipality

2) Regional officials including the governor of the region

3) Federal officials including the president

ELperformancelocal. Are you satisfied with the performance of [**head of municipality/ governor of the region**] that you live in?

1) Very satisfied

2) Satisfied

3) Unsatisfied

4) Very unsatisfied

ELperformancefed. Are you satisfied with the performance of the president of Russian Federation?

1) Very satisfied

2) Satisfied

3) Unsatisfied

4) Very unsatisfied

Finally, we wanted to ask some more questions about you...

income. How would you evaluate your material wellbeing?

1) Not enough money for food

2) Enough money for food, but cannot afford to buy clothes

3) Enough money for food and clothes, but cannot afford to buy long-term appliances

4) Enough money for long-term appliances, but cannot afford to buy a car

5) Enough money for most things, but cannot afford to buy real estate

6) Enough money for most things, including real estate

female. What is your gender

1) Female

2) Male

education. What is the highest level of education you attained

1) Primary education

2) Secondary basic education

3) Secondary professional education

4) Incomplete graduate education

5) Complete graduate education

Thank you for your time

ELdemandeffects. Which of the following statements in your opinion best describes the purpose of this survey?

1) Measurement of mass media preferences
2) Measurement of link between mass media preferences and road construction/natural disaster prevention satisfaction
3) Measurement of the effect of mass media on political preferences
4) Measurement of citizen satisfaction with government performance in public policies
5) Measurement of news report effects on attribution of responsibility for public policy

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