Bottom-Up Accountability and Public Service Provision: Evidence from a Field Experiment in Brazil

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Abstract

Does local oversight improve public service delivery? We study the effect of a mobile phone application that allows citizens to monitor school construction projects in Brazilian municipalities. The app prompts users to submit data about construction sites, sends such crowdsourced information to independent engineers, and contacts the mayors' offices about project delays. Our results show that the app has a null impact on school construction indicators. Additionally, we find that politicians are unresponsive to individual requests. The results question the impact of bottom-up monitoring on public service performance and suggest that interventions targeted at other groups, or focused on different issues, may produce better policy outcomes.

Keywords: accountability, Brazil, impact evaluation, state capacity, technology

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1 Introduction

A robust accountability system is crucial for efficient public services provision (Besley and Ghatak 2003; Cameron 2004; Ferejohn 1986; O'Donnell 1998). In its standard definition, accountability is understood as the process of holding authorities responsible for their actions (Finer 1941; Mulgan 2000; O'Loughlin 1990). Past studies show that accountability has a positive impact on governance; it ensures that politicians act on behalf of voters (Freire 2010; Moncrieffe 1998), reduces the opportunities for rent-seeking and corruption (Deininger and Mpuga 2005; Wenar 2006), and improves the quality of public services (Adsera et al. 2003; Björkman and Svensson 2009). Recent research also suggests that accountability leads to higher economic growth because it limits state discretion in the economy and increases long-term investments in human capital (Benhabib and Przeworski 2010; Suebvises 2018; Ponzetto and Troiano 2018).

However, accountability mechanisms extend beyond elections. One promising model is that of *bottom-up monitoring*, in which citizens receive information about the shortcomings of a given project so they can evaluate and pressure underperforming public officials (Kosack and Fung 2014; Molina et al. 2016; Raffler et al. 2018). Proponents argue that bottom-up accountability is effective because: 1) constituents have first-hand information about the outcomes of local policies; 2) citizens have incentives to attack corruption that directly affects themselves; 3) policy-makers are sensitive to social punishment from their own communities (Serra 2011, 570). In this regard, bottom-up accountability offers a potential solution to the principal-agent dilemma in public service by aligning the interests of state officials with those of the constituency they serve (Barro 1973; Raffler et al. 2018).

Here we assess the impact of *Tá de Pé* (TDP), a mobile phone application designed to lower the costs of evaluating public works and punish political representatives in Brazil. Developed by Transparência Brasil[1], TDP allows citizens to learn the location of public school construction sites, check their completion status, and anonymously request information from competent authorities. TDP users can also take pictures of the construction sites and submit them to independent engineers for examination. If the engineers classify the construction as delayed, TDP prompts users to send a message to the mayor's office asking for completion estimates and explanations about the construction

[1]Transparência Brasil is an non-governmental organisation whose mission is to 'promote transparency and social control of public power'. It has been active since April 2000, receives no public funding, and is non-partisan. More information at http://transparencia.org.br (access: July 2019).

status. TDP has been online since April 2017 and was the winner of the 2016 Google Social Impact grant with more than 200,000 popular votes[2].

We use the TDP app to conduct two experimental interventions and test the impact of citizen oversight on five outcomes related to school completion rates and complaints to public authorities. Overall, providing information to citizens has no consistent impact on policy outcomes. In the first experiment, we find that the TDP app increased the likelihood of construction cancellation by 2 per cent, but the result does not replicate. The remaining five models have null results. In our second intervention, none of the estimations reach conventional levels of statistical significance. Importantly, all coefficients are small, which suggests that even if the TDP app had a significant effect on the outcomes, its substantive impact would be negligible.

The findings raise questions about the ability of citizens to hold representatives accountable using bottom-up monitoring. On the one hand, Björkman and Svensson (2009), Lagunes (2018), and Reinikka and Svensson (2005) report better policy outcomes after providing information to local communities. On the other hand, Banerjee et al. (2010), Keefer and Khemani (2014), Lieberman et al. (2014), Björkman Nyqvist et al. (2017), Olken (2007), and Raffler et al. (2018), find little evidence that information-based interventions lead to greater government responsiveness. Our results are in line with the latter group and suggest that local oversight is ineffective in altering government behaviour in Brazil.

2 The *Tá de Pé* Project

The *Tá de Pé*[3] (TDP) cell phone application is an initiative carried out by Transparência Brasil to foster bottom-up accountability in the Brazilian public sector. More specifically, the main goal of the TDP project is to improve responsiveness in government education expenditures. The TDP app incentivises citizens to provide up-to-date information about unfinished school constructions in their neighbourhoods, and that information will be assessed by a group of independent specialists. In the case the construction is behind schedule, TDP provides a writing platform whereby citizens can report to public officials quickly and anonymously. The app then writes a notification to the

[2] About 1,000 Brazilian charities participated in the 2016 Google Social Impact Challenge. An independent committee selected 10 organisations as finalists, and Transparência Brasil won the challenge with about 200,000 popular votes. To know more about the contest, please visit https://impactchallenge.withgoogle.com/brazil2016 (access: July 2019).

[3] *Tá de Pé* is an informal Brazilian expression for 'is it done?'. Literally, it means 'standing on its feet' in Portuguese.

mayor's office, which has 15 days to reply. If they do not respond to the request, the app forwards the notification to the Brazilian Ministry of Education, making it harder for the municipality to access federal funds in the future. The motivation behind this intervention is that providing information to citizens empowers individuals to closely monitor public works. This, in turn, results in better social outcomes as public agents become more responsive to community demands.

Transparência Brazil built the app from January to March 2017 and tested it in May of that year. The first stable Android version was deployed on Google Play on 14 August 2017. A version for iOS came about six months later. In October 2017, Transparência Brazil started a Facebook campaign in order to publicise the app. Facebook is the most widely used social media network in Brazil with around 72 million users (Statista 2018). The campaigns attracted 2,028 new users to the platform in October 2017 only.

Figure 1: The *Tá de Pé* mobile phone application. The first image presents a list of school construction sites close to the users' location. The second image shows that the school construction selected by the user is delayed by 9 months. The last image shows how citizens can add information to the photos they submit via the app.

Transparência Brasil partnered with the Brazilian branch of *Engineers without Borders* (EWB), an independent non-governmental organisation[4], to provide technical assessment of school completion rates based on user-submitted photos and GPS coordinates. The engineers' reports are later uploaded to the TDP database and stored on the users' mobile devices so citizens can follow the progress of the reported constructions.

[4]Please visit `http://www.ewb-international.org` to know more about Engineers without Borders International and `https://esf.org.br` for information on the Brazilian office.

The TDP also received feedback from Brazilian computer scientists and policy analysts. In 2017 and 2018, Transparência Brasil announced two team programming competitions, called 'Tá de Pé Hackathons', where contributors could fix code bugs and suggest new functionalities to the TDP project. One of these innovations consists of a Twitter bot (https://twitter.com/tadepeapp) which posts a message on the social network each time a user submits a new picture for evaluation or a municipality responds to a citizen's request. This allows any interested parties, including those who do not use the TDP app, to check the state of school construction sites.

3 Experimental Design

Between August 2017 and July 2019, we implemented two interventions to measure the effect of the TDP app on five school construction outcomes plus a placebo test. The outcomes are: 1) a placebo outcome indicating the percentage of the project completed before the impact evaluation started; 2) the percentage of the project completed by the end of the interventions; 3) the difference between the percentage reported as completed before and after the interventions; 4) the number of finished constructions; 5) the number of cancelled constructions; 6) the number of schools where construction companies updated the conclusion dates. Table 1 depicts the expected effects for each of the studied outcomes[5].

The first intervention was carried out from August 2017 to July 2018 using the Android version of TDP. The randomisation was conducted at the municipal level. We randomly selected 344 municipalities to the control group and included 2,642 in the treatment group. Our control condition consists in removing all information about school construction from the TDP app in the chosen municipalities, so that citizens were unable to report constructions in the control municipalities.

To evaluate the random assignment, we used the following pre-treatment variables: 1) log of municipal population in 2015; 2) log of number of poor families in each city; 3) log of total federal transfers to the municipality in 2016; 4) federal government indicator for primary school quality; 5) federal government indicator for secondary school quality. The data come from the Brazilian Ministry of Education and the 2010 Brazilian Census. Balance tests show that the randomisation was successful and are available in the Supplementary Materials.

[5]Please refer to the Online Appendix for further details on the treatment implementation and the coding of the outcome variables.

Table 1: Outcomes and expected effect of the TDP intervention

	Expected impact	Meaning
Placebo: Percentage of the project completed before the impact evaluation started.	Null	The placebo outcome, as reported before the intervention, should have a null impact. This represents the absence of differences between treatment and control prior to the intervention.
Outcome 1: Percentage of the project reported as completed by the end of the intervention period.	Positive	If the intervention has a positive effect, the firms should increase their efforts toward finishing the construction more quickly.
Outcome 2: Difference between the percentage reported as completed before and after the intervention.	Positive	If the intervention has a positive impact, the difference between before and after the intervention should reflect this.
Outcome 3: Dummy indicator for finished constructions.	Positive	If the intervention has a positive effect, more schools should be reported as finished in the treatment group.
Outcome 4: Dummy indicator for cancelled construction.	Negative	If the intervention has a positive impact, less constructions should be abandoned and reported as finished in the treatment group.
Outcome 5: Number of schools where construction companies updated the conclusion dates.	Positive	If the intervention has a positive effect, firms and mayor's offices should be responsive to the public, and update their finishing dates.

We also conducted two manipulation checks and analysed the number of TDP app downloads by municipality and over time. Figure 2 displays the results and indicates that the treatment has good territorial variability. There are 455 downloads in the 1,023 municipalities in the treatment condition. Downloads peak during the Facebook TDP campaign, launched in October 2017, then diminish in the following months. Overall, 6,092 users downloaded the app during intervention 1.

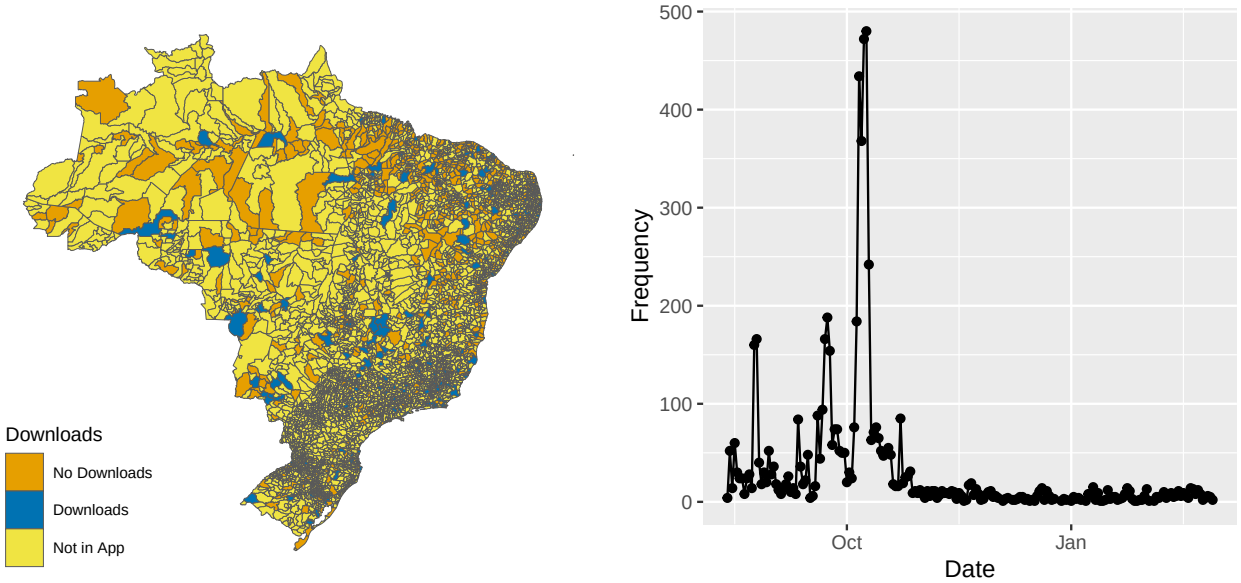

Figure 2: Manipulation checks for intervention 1. The first plot shows the geographical distribution of the treatment condition and the second graph displays the number of TDP app downloads from August 2017 to July 2018.

The second intervention is similar to intervention 1 in all but three characteristics. First, the TDP app was then available for both Android and iOS devices. Second, we randomised the intervention at the school level, with 659 control and 3,717 treatment units. We used blocked randomisation stratified by Brazilian states, school construction status (under construction, stopped, unfinished), and whether the municipality spent more on school construction than the distribution median. Finally, the intervention period lasted from August 2018 to July 2019.

Balance tests and manipulation checks were also successful for intervention 2. In total, 443 municipalities downloaded the app. There is about 1,000 user downloads in August 2018, right after intervention 2 starts, and a second spike around December. The app gained 4,078 new users during intervention 2. The number of downloads is smaller in this second intervention as there was no associated social media campaign in that period.

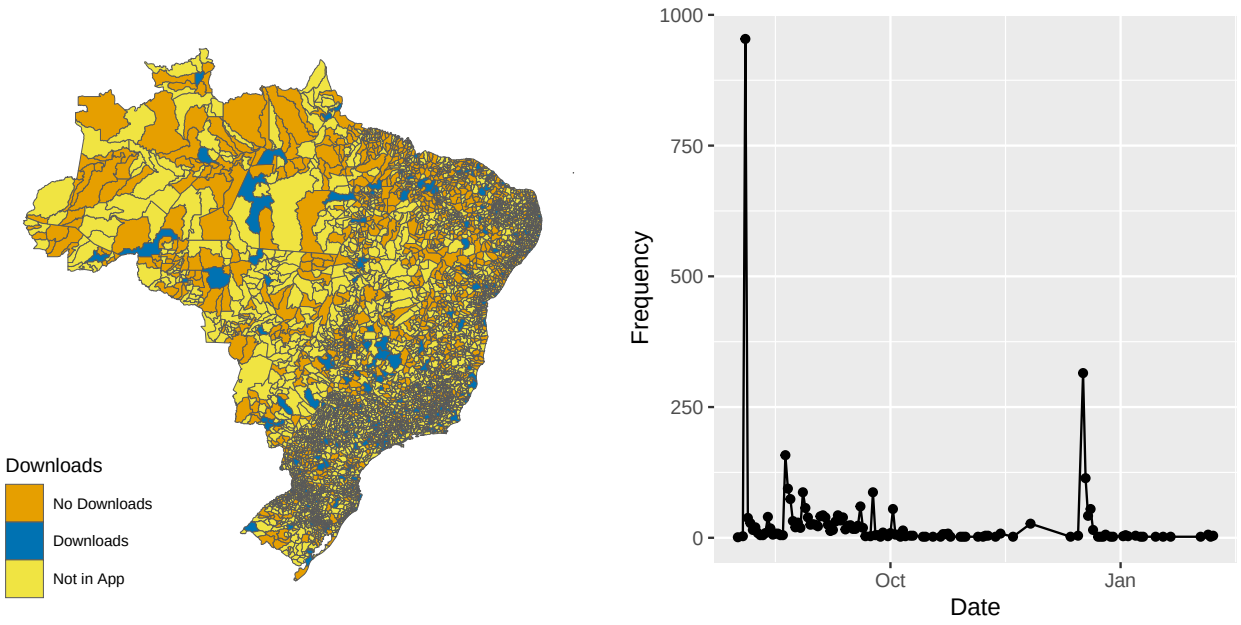

Figure 3: Manipulation checks for intervention 2. The graphs display the geographical and temporal variation of TDP app downloads from August 2018 to July 2019.

Data from Google Analytics suggest that users did engage with the TDP app. On average, each user launched 60 app sessions, which indicates their interest in the application. In total, the app had 53,928 screen visualisations, with an average of 2.42 screen visualisations per session.

We estimate all models using the following regression equation:

$$Y_i = \alpha + \beta T_i + \gamma X_i + \theta Z_i + \varepsilon_i \tag{1}$$

where i indexes the experiment units. Y_i is one of the six outcomes described above, α is the intercept, β denotes the average treatment effect, and T_i is a binary treatment indicator. γ is a vector of fixed effects, X_i is a matrix of Brazilian states' fixed effects, θ is a vector of controls, and Z_i an array of controls for the case i. The error term is denoted by ε_i. We cluster the standard errors at the municipality level as mayors are responsible for school investment decisions in Brazil.

4 Results

Table 2 summarises the main results of intervention 1. Each column represents the treatment effect of the TDP app on one of the outcomes we measured for this study. All models reported here include the five control variables described in the previous section and Brazilian states' fixed effects. We also estimated the models without control variables, without fixed effects, and with nearest-neighbour matching. The results are very similar to those below.

Table 2: Impact Evaluation – Intervention 1

	Dependent variable:					
	Investment Before	Investment After	Delta Investment	Finished Construction	Cancelled Construction	Updated Date
	(1)	(2)	(3)	(4)	(5)	(6)
ATE	−0.99	−1.12	−0.13	0.002	0.02**	0.05
	(2.59)	(2.96)	(1.03)	(0.01)	(0.01)	(0.05)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,986	2,986	2,986	2,986	2,986	2,926
R^2	0.16	0.14	0.05	0.02	0.07	0.13

Note: *p<0.1; **p<0.05; ***p<0.01
Cluster-robust SEs at the municipality level.

We find that the app only has a small effect on cancellation rates. The TDP application increases the likelihood of cancelling the construction by 2.07 percent. While this result goes in the opposite direction of our theoretical expectations, the finding is inconsistent and does not replicate in the second experiment. All other coefficients are not statistically significant at conventional levels. On the one hand, the results indicate that our placebo outcome, the percentage of the invested

executed before the intervention, indeed behaves as predicted. On the other hand, we expected the five remaining outcomes to improve after the introduction of the app. The literature on bottom-up accountability argues that delivering more information about the shortcomings of public services provision will put citizens in a position where they can monitor state agents and improve provider behaviour (Raffler et al. 2018). Our results do not lend support to that hypothesis.

Table 3 shows the results of the second intervention. The treatment does not have a statistically significant effect on any of our outcomes of interest, including the placebo. This raises further questions about the effect of the TDP app on school completion. Note that the effect signs are also inconsistent with improving the outcomes, which demonstrates that our results do not derive from low statistical power or the reduced control group size.

Table 3: Impact Evaluation – Intervention 2

	Dependent variable:					
	Investment Before	Investment After	Delta Investment	Finished Construction	Cancelled Construction	Updated Date
	(1)	(2)	(3)	(4)	(5)	(6)
ATE	−1.33	−2.26	−0.94	−0.001	0.01	0.002
	(1.45)	(1.56)	(0.61)	(0.01)	(0.01)	(0.02)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,226	3,226	3,226	3,226	3,226	3,109
R^2	0.12	0.11	0.04	0.02	0.17	0.09

Note: *p<0.1; **p<0.05; ***p<0.01
Cluster-robust SEs at the municipality level.
IPW computed by the randomizr package.

Figure 4 shows the results of our randomisation inference tests. Randomisation inference allows us to estimate the probability of the sharp null hypothesis over all possible randomisations that could have occurred under our research design (Coppock 2019; Gerber and Green 2012). We fail to reject the null in all but the finished school indicator in experiment 1.

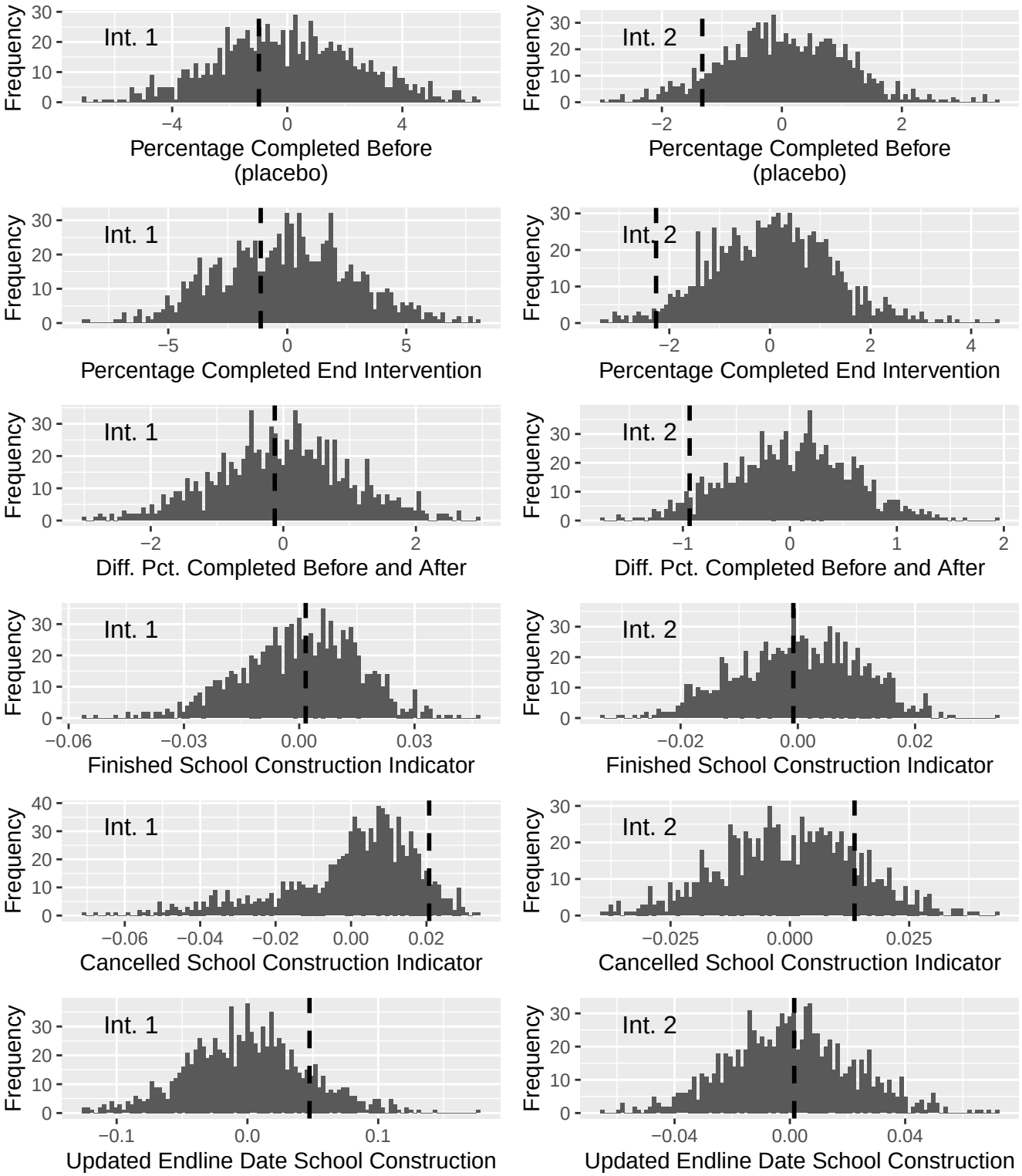

Figure 4: Sampling distribution of the estimated coefficient for our six outcomes in two interventions. Graphs on the left correspond to randomisation inference estimates for intervention 1 and those on the right describe the results for intervention 2.

We also note that effect sizes are small in all estimations and that the coefficients flip signs in all but one of our six dependent variables. This provides further evidence for the null results: not only the app would have a low impact even if the treatment were significant, but the results could

go against what the bottom-up accountability theory predicts. At least in the school construction outcomes we investigate here, we find little evidence that grassroots monitoring works in the context of school constructions in Brazil.

5 Discussion

In this paper, we discuss whether delivering information to citizens via a mobile phone application fosters community oversight and political accountability in Brazil. Our two interventions show that the results are at best mixed. Although we find some treatment effect on school cancelling rates in the first intervention, the app has no consistent impact on our outcomes of interest. These findings add to the studies that cast doubts on the relationship between bottom-up accountability and local policy performance (e.g., Banerjee et al. 2010; Lieberman et al. 2014; Raffler et al. 2018).

What factors, then, are driving these results? It seems unlikely that the null results derive from flaws in the research design. First, our study is well powered. Although the treatment is indirect—the person has to download the app, find a school construction, and then report it—, we included a substantial number of schools in the treatment groups. Second, balance and manipulation tests indicate that the treatment allocation was successful, so we can rule out problems in the randomisation procedures. Third, data from Google Analytics confirm that citizens indeed used the app and provided information to our dataset. This indicates that the treatment manipulation was effective. In this sense, it is unlikely that our results derive from low user response. Fourth, after doing a series of robustness tests, we still find no firm evidence of treatment effect. Finally, note that the signs of the coefficients are frequently contrary to our theoretical expectations. This rules out a possible concern about statistical power with our small control group approach.

We discuss some possible reasons why community monitoring did not work in our case. One plausible explanation is that individuals were unable to differentiate the effect of political corruption from those of spending cuts. Due to the severe economic crisis in 2014–2016, the Brazilian federal government introduced discretionary spending limits that affected public investment (Rossi and Dweck 2016). Politicians may argue that delays in school constructions are not derived from their misuse of government funds but from the austerity measures. If this is the case, citizens will not blame local politicians for the underprovision of public goods. Consequently, representatives can

dismiss individual requests as the issue is unlikely to escalate.

The electoral cycle might also have decreased the potential effect of the treatment. As the experiment was fielded right after Brazil's municipal elections, incumbents might have disregarded the requests because they did not see the demands as politically costly in the short run. Having just taken office, mayors might have focused their attention on the formation of government coalitions or to budget concerns. Future research may evaluate how electoral dynamics interact with citizen oversight, potentially by replicating informational experiments in different stages of the political cycle.

In sum, our experiments suggest that popular participation and bottom-up monitoring may not be effective to improve public service delivery in the case of school constructions in Brazil. Nevertheless, the null findings are informative to researchers and policy-makers. The most important recommendation derived from this study is that interventions targeting elite groups, such as lobbyists or civil servants, might render better school construction outcomes than those focused at the community level. Another core lesson is that although digital interventions are promising means to deliver information, perhaps they do not have the same impact as personal, face-to-face communication. Since many developing countries share Brazil's issues with education provision, the shortcomings we describe here serve as warnings for future interventions. Finally, whether this study generalises beyond school constructions to other bottom-up programs, and to other contexts, remains to be studied.

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