Information Disclosure and the Performance of Public Investment

The Case of Costa Rica

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IDB

ABSTRACT*

This paper provides experimental evidence about the causal impact of disclosing information related to public investment projects on the performance of these projects. Specifically, it analyzes the impact of the launch of the MapaInversiones platform on the physical and financial progress of public investment projects in Costa Rica. The study finds that published projects (the treatment group) perform better than unpublished projects (the control group). Three months after the release of MapaInversiones, financial progress of public investment projects uploaded onto the platform increased by 18 percentage points, and physical progress increased by 8 percentage points compared to unpublished projects. A year after the intervention, financial progress of treated projects was approximately 15 percentage points higher relative to control projects, while the increase in physical progress after 1 year of launching the platform was approximately 1 percentage point.

Keywords: digital innovation, efficiency, investment projects, monitoring, transparency
JEL classification: D73, O31, H50, H83, L78, O54

INTRODUCTION

Does making information on public investment projects readily available to the public improve their performance? This study aimed to answer this question by providing experimental evidence on MapaInversiones, an online platform in Costa Rica. Out of the universe of public investment projects (649), a total of 460 projects were randomly assigned and published on the MapaInversiones Costa Rica platform in April 2018 (treatment group). The remaining 189 projects were published one year later (control group).

Three months after the release of MapaInversiones Costa Rica, the treated projects (those whose information was uploaded to the platform) showed an increase of about 8 percentage points in physical progress and an increase of 18 percentage points in financial progress compared to the control projects. A year later, the results remain positive, with an increase of 15 percentage points in financial progress and of approximately 1 percentage point in physical progress.

The study explores potential channels and finds that the treated projects receive about 7 percentage points more comments and feedback than the control projects. This evidence suggests that the estimated effect may be driven by an increase in public monitoring.

This paper adds to a growing body of empirical literature on the relationship between information dissemination and accountability. One strand of this literature focuses on how citizens can make government agencies improve the quantity and quality of public services (Björkman and Svensson, 2009; Bkörman, De Walke, and Svensson, 2017; Lagunes, 2018). Another strand focuses on how having informed voters can affect politicians' behavior (Besley and Burgess, 2002; Snyder and Strömberg, 2010; Strömberg, 2015), voters' responsiveness (Banerjee et al., 2011; Ferraz and Finan, 2008; Strömberg, 2015; Kendall, Nannicini, and Trebbi, 2015; Larreguy, Marshall, and Snyder, 2014), and political participation (Falck, Gold, and Heblich, 2014; Gentzkow 2006; Gentzkow, Shapiro, and Sinkinson, 2011; Oberholzer-Gee and Waldfogel, 2009; Snyder and Strömberg, 2010; Stromberg 2004, 2015). The paper contributes to this literature by studying how information disclosure can affect the performance of public investment projects.[1]

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[1] A similar project was analyzed in a non-experimental way in Colombia (Lauletta et al., 2019).

The paper also relates to the literature on the link between community participation and public service delivery. The evidence in this literature is mixed. Some studies find no effect of increasing community participation on corruption (Olken, 2007) and educational outcomes (Banerjee et al., 2010; Barr et al., 2012). Other studies find that increasing community participation increases the quality and quantity of primary health care provision (Björkman and Svensson, 2009; Bkörman, De Walke, and Svensson, 2017), leads to a significant improvement in learning (Duflo, Dupas, and Kremer, 2015), increases test scores, decreases private school fees, and increases primary school enrollment (Andrabi, Das, and Khwaja, 2017). In general, the literature on the effects of community participation on public service delivery focuses on small-scale programs and on a particular sector. This paper adds to this literature by studying the impact of a country-wide program that includes multiple sectors.

Finally, the paper ties in with the literature on the impact of technological improvements in state capacity. Most of the studies focus on how e-governance reforms can reduce the diversion of funds and therefore corruption (Banerjee et al., 2020; Barnwal, 2014; Bertot et al., 2010; de Michele and Pierri, 2020; Heeks, 1998; Lewis-Faupel et al., 2016; Muralidharan, Niehaus, and Sukhtankar, 2016; Pathak et al., 2009). This study looks at how a government can increase the performance of public investment projects by disclosing information on an e-platform.

INTERVENTION, DATA, AND EXPERIMENTAL DESIGN

In 2017, the Costa Rican government and the Inter-American Development Bank (IDB) agreed to conduct a randomized controlled trial to study whether the disclosure of information affects the performance of public investment projects. In March 2018, the government, with the support of the IDB, launched MapaInversiones, an online platform where citizens can see geo-referenced information, make inquiries, and check the progress of public investment projects.[2] The goal of the platform is to reduce the cost of accessing information on the use of public resources, potentially increasing the incentives to monitor the execution of public investment projects.

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[2] The platform can be found at: http://mapainversionescr.mideplan.go.cr/.

The IDB developed the platform in coordination with the Office of the President, the Ministry of Planning and Economic Policy, the Ministry of Public Infrastructure and Transportation, and the Ministry of Finance. MapaInversiones Costa Rica contributes to the country's alignment with international commitments such as the Open Government Partnership (OGP), and the Infrastructure Transparency Initiative (CoST). In addition, it advances Costa Rica's progress in transparency and open government following the guidelines of IDB's Transparency and Integrity Sector Framework Document (IDB, 2020).

DATA

At the time of this study, there were 649 eligible public investment projects managed and executed by 57 government agencies from many sectors, including infrastructure, tansportation, health, energy, agricultural development, and education, among others. Eligible projects included small projects (such as the purchase of new furniture for a school) and large projects (such as building a water supply system). Government agencies in charge of executing the projects include, for example, the National Roads Authority (Consejo Nacional de Vialidad), Costa Rican Institute of Aqueducts and Sewers (Instituto Costarricense de Acueductos y Alcantarillados), and Limón College (Colegio Universitario de Limón), among others.

The Ministry of Planning and Economic Policy in Costa Rica provided the data. The study used data for two pre-treatment characteristics, two primary outcomes, and one secondary outcome. The pre-treatment characteristics are time progress (the proportion of the original estimated project time that has elapsed by March 2018) and approved budget (the budget the project was assigned as of March 2018).[3]

The primary outcomes are financial progress and physical progress. Financial progress is the proportion of the approved budget the agency has used in the project. Physical progress is the percentage of the project that has been completed.[4] The secondary

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[3] Note that time progress may be greater than one, since projects can last longer than expected.

[4] Physical progress is calculated as the average percent completion of all project stages.

outcome (Queries) is a dummy variable that takes the value 1 if the project received a query (including comments and feedback) between April 2018 and October 2019.

It is important to clarify that the study of the impact of public investment on social welfare is beyond the scope of this paper. It is not the purpose of this study to evaluate whether the objectives of public investment projects are appropriate or not. We assume that a project performs well when the allocated budget is spent and the agreed stages are completed on time. Thus, for purposes of this study, physical progress and financial progress are adequate measures of the performance of public investment projects.

Information was collected on physical and financial progress at three moments in time: before the launch of the platform (March 2018) and after the launch of the platform (July 2018 and April 2019). The platform was launched in April 2018. Table 1 presents summary statistics of the data.

TABLE 1 • SUMMARY STATISTICS					
	Observations	Mean	Standard deviation	Min.	Max.
Pre-treatment characteristics					
Time progress	649	1.32	1.04	0	10
Approved budget (millions of *colones*)	649	12,603	68,033	0	922,272
Pre-treatment primary outcomes					
Physical progress	649	0.47	0.29	0	1
Financial progress	649	0.14	0.64	0	15.01
Post-treatment primary outcomes					
Physical progress July 2018	648	0.54	0.32	0	1.00
Physical progress April 2019	615	0.61	0.32	0	1.00
Financial progress July 2018	640	0.26	0.70	0	15.01
Financial progress April 2019	636	0.32	0.44	0	2.57
Post-treatment secondary outcomes					
Queries (April 2018–October 2019)	649	0.07	0.26	0	1.00

Source: Authors' elaboration.
Notes: All pre-treatment characteristics and pre-treatment primary outcomes correspond to March 2018.

EXPERIMENTAL DESIGN

The study followed a phasing-in design. A total of 460 projects from 29 agencies were randomly assigned to be uploaded to the platform in April 2018 (treatment group), and 189 projects from 28 agencies were randomly assigned to be uploaded 12 months later, in April 2019 (control group). The randomization was performed using the Stata random number generator. Agencies were stratified by size (large and small). An agency is considered large if its approved budget is in the top 15th percentile (9 agencies); otherwise it is considered small (48 agencies). Since an agency can be in charge of more than one project, to avoid potential spillover effects, randomization was performed at the agency level.

RANDOMIZATION CHECK

An implication of random assignment is that pre-treatment characteristics should be orthogonal to lottery assignment. To check this, Table 2 reports results from separate regressions of the assignment status against the pre-treatment variables available. For three out of four pre-treatment variables, there are no statistically significant differences between projects assigned to the treated group and those assigned to the control group. All regressions controlling for the set of pre-treatment variables are reported in the results section.

TABLE 2 • RANDOMIZATION CHECK				
	Pre-treatment characteristics		*Pre-treatment primary outcomes*	
	(1)	(2)	(3)	(4)
	Time progress	Approved budget (millions of *colones*)	Financial progress	Physical progress
Assigment	−0.285 (0.230)	−3,596 (5,468)	−0.001 (0.037)	−0.099*** (0.032)
Observations	649	649	649	649

Source: Authors' elaboration.
Notes: All variables correspond to March 2018. Each column reports separate OLS estimates of each variable against the random assignment. All models include strata fixed effects. Standard errors clustered at the agency level are shown in parentheses. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

NONCOMPLIANCE

In experimental settings, a potential source of bias is noncompliance. In this setting, this happens when some agencies that were assigned to upload their projects to the platform did not do so or when some agencies that were not assigned to upload their projects to the platform did so. Table 3 presents the results of the regression of the treatment against the assignment, and compliance was extremely high. Projects that belong to agencies assigned to the treated group are 95 percentage points more likely to have their information uploaded compared to projects that belong to agencies assigned to the control group.

TABLE 3 • FIRST-STAGE ESTIMATES AND MAIN RESULTS					
		Short term: July 2018		Medium term: April 2019	
	(1)	(2)	(3)	(4)	(5)
	Treatment	Physical progress	Financial progress	Physical progress	Financial progress
Assignment	0.950*** (0.052)	0.076** (0.033)	0.185*** (0.059)	0.009 (0.039)	0.151* (0.079)
% change		13.54	127.39	1.36	57.42
R-W		0.059	0.000	0.627	0.157
Observations	649	648	640	615	636

Source: Authors' elaboration.
Notes: Standard errors clustered at the agency level are shown in parentheses. All models include strata fixed effects and control for all the pre-treatment variables listed in Table 1. Percentage change is calculated relative to the mean of the outcome in the control group. R-W are Romano and Wolf (2005a,b) step-down adjusted p-values robust to multiple hypothesis testing. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

ATTRITION

Some agencies did not report all the information about some of the projects after the random assignment. Because of this, a concern is potential selection into the sample. If the number of projects with missing information were big and selection into the sample

were non-random, the estimated treatment effects would be biased. In this case, the number of projects with missing information is small and there is no evidence for differential selection into the sample (see Table A1 in the appendix). Overall, the lottery assignment into MapaInversiones, the insignificance of attrition and noncompliance, and the balancing of most pre-treatment variables indicate that the results are not subject to significant sources of selection bias.

ECONOMETRIC METHODS AND RESULTS

We examine the causal effect of MapaInversiones on the performance of public investment projects in a regression framework. Formally, we want to estimate the following equation:

$$Y_{iu} = \phi_s + \beta Treatment_{iu} + y X_{iu} + \varepsilon_{iu} \tag{1}$$

where Y_{iu} are outcomes for project i and agency u, $Treatment_{iu}$ is a dummy variable that takes the value of 1 if project i belongs to an agency u that uploaded information to the online platform in April 2018 and 0 otherwise, ϕ_s are strata fixed effects, X_{iu} is a vector of pre-treatment characteristics (including pre-treatment primary outcomes), and ε_{iu} is an error term.

As compliance is extremely high, we directly estimate the intention to treat (ITT) parameter. That is, we estimate a variant of equation (1) in which the treatment variable (*Treatment*) is replaced with the intention to treat variable (*Assignment*). We cluster standard errors at the agency level in all estimates of the ITT parameter. To address concerns about multiple hypotheses testing, we report Romano and Wolf's (2005a,b) step-down adjusted p-values.

Table 3 reports ITT estimates, controlling for the set of pre-treatment variables available. Three months after the platform's release, projects assigned to upload their information showed a statistically significant increase of 7.6 percentage points in their physical progress and a statistically significant increase of 18.5 percentage points in their financial progress. A year after the launch, projects assigned to upload their information show an increase of 15.1 percentage points in their financial progress and an increase of almost 1

percentage point in their physical progress (although the coefficient in this case is not significant).

To have a reference point of the size of the effects, we calculate the percentage change relative to the mean of the outcomes in the control group. In the short term, treated projects have a physical progress and financial progress 13.5 and 127.4 percent higher than the control group, respectively. In the medium term, treated projects have a physical progress and financial progress 1.4 and 57.4 percent higher than the control group, respectively.

Overall, we find a positive effect of the launch of the platform on the performance of treated projects, considering both the three-month and the one-year windows of analysis. With respect to the physical progress of projects, the effect of the platform seems to be stronger in the short term.

FURTHER RESULTS

Making information available to the public domain can lead to an improvement in the efficiency of public investment projects. One potential channel for this is through increased monitoring. Because community members benefit from a successful program, they may have incentives to participate in monitoring the project, even with greater levels of commitment or effort than central government officials or external agencies (Stiglitz, 2002).

The media covered the launch of MapaInversiones, and journalists used the information on the platform to do research.[5] There is evidence that the launch was receiving attention through social media, including Twitter and YouTube.[6] One

[5] Retrieved from: https://elsoldeoccidente.com/enlinea/2018/03/ciudadania-podra-fiscalizar-avance-de-proyectos-estatales/.
https://www.diarioextra.com/Noticia/detalle/404927/gobierno-no-rinde-cuentas-de-inversion-en-infraestructura.
[6] https://twitter.com/luisguillermosr/status/973628812687749120.
https://twitter.com/la_cortesa/status/973688672527769600.
https://www.youtube.com/watch?v=2RE_nAnx3_I.
https://www.youtube.com/watch?v=VHTlw0bRJUk.

potential consequence of this increase in media coverage is that, after the launch of the platform, treated projects should be receiving more queries (including comments and feedback). This study tested this idea by comparing queries received by the treated and the control projects.

Treated and control projects can receive feedback through an email account specially created for that purpose. Treated projects can, additionally, receive feedback through the platform.[7]

Estimates reported in Table 4 indicate that being assigned to the platform increases the probability of projects receiving a query by about 7 percentage points. This result suggests that a potential channel through which information disclosure leads to an improvement in the performance of public investment projects is an increase in monitoring.

TABLE 4 • FURTHER RESULTS					
		Short term: July 2018		Medium term: April 2019	
		(1)	(2)	(3)	(4)
	Queries	Physical progress	Financial progress	Physical progress	Financial progress
Assignment	0.069* (0.037)	0.146*** (0.041)	0.285*** (0.074)	0.050 (0.051)	0.232** (0.101)
Assignment*Big		−0.150*** (0.041)	−0.210*** (0.064)	−0.074* (0.044)	−0.162** (0.080)
Observations	649	648	640	615	636

Source: Authors' elaboration.
Notes: Standard errors clustered at the agency level are shown in parentheses. All models include strata fixed effects and control for all the pre-treatment variables listed in Table 1. *Significant at the 10% level. **Significant at the 5% level. ***Significant at the 1% level.

We also check for differential effect depending on the size of the project by adding an interaction term between *Assignment* and the size of the project. We construct

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[7] For those projects that were not uploaded onto the platform, providing feedback on a project may involve a costly procedure. For example, someone interested in making a query outside the platform must figure out the agency in charge of the project and send an email (or a letter) to that office.

a dummy variable, *Big*, that takes the value one if the project's approved budget is above the median and zero otherwise. As reported in Table 4, the coefficient on the interaction term is negative and statistically significant. This result indicates the effect of MapaInversiones is larger for small projects.

There are at least two potential explanations for this finding. The first is that government agencies prioritize completion of small projects (purchasing of equipment, local public works, etc.), over large ones (highways, bridges, etc.), because small projects may require faster execution times and are less complex in terms of reporting requirements. Another explanation is that larger projects usually include more complex bidding processes as well as social and environmental safeguards, which take time and involve a wide range of risks. Further research could help shed light on these potential explanations.

CONCLUSIONS

This study provides experimental evidence on the causal impact of access to information on the performance of public investment projects. It finds that projects that were uploaded onto the platform performed better than projects that were not. Specifically, it finds that three months after the release of MapaInversiones, uploaded public investment projects show an increase of 7 percentage points in physical progress and an increase of 18 percentage points in financial progress. One year after the intervention, treated projects show an increase of 15 percentage points in financial progress relative to control projects and approximately 1 percentage point in physical progress.

Although the data collected in this experiment and presented in this paper do not provide insights to explain this trend, the findings might open avenues for future research. Specifically, differences in physical progress in the short and medium terms could be associated with changes in the scope of the projects that usually occur in large contracts for technical, economic, and socio-environmental reasons. Also, updates in physical progress data by the government could be delayed because of administrative processes and subsequently not reflect the real progress. While the empirical results of the paper suggest that the increase in physical efficiency for the experimental group is not statistically significant after a year, further qualitative research to better understand

the measurement of physical progress could strengthen the effects described here. In addition, future research should look at the political economy of incentives of different stakeholders who are critical to the way that public investment systems operate, particularly executing agencies.

The evidence also suggests that the better performance of the treated projects is driven by an increase in monitoring. The increase in monitoring can come from different sources, and the results of this study cannot distinguish which of them is operating. To help design this experiment, we conducted focus groups with potential sources of monitoring in Costa Rica, including citizens, journalists, politicians, and different levels of government, but additional qualitative research is necessary to explain the response of different stakeholders to the disclosure of public investment data.

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APPENDIX

TABLE A1. ANALYSIS OF ATTRITION

	Physical progress		Financial progress	
Period	July 2018	April 2019	July 2018	April 2019
Number of attritors	1	34	9	13
Panel A				
Proportion of attritors				
Control Group	0.01	0.06	0.02	0.03
Treatment Group	0.00	0.05	0.01	0.02
Difference	−0.01 (0.00)	−0.01 (0.02)	−0.01 (0.01)	−0.01 (0.01)
Panel B				
Pre-treatment characteristics				
Time progress	−0.32	−0.54*** (0.18)	−0.15 (0.35)	−0.05 (0.29)
Approved budget (millions of *colones*)	−11,601	−2,700 (11,995)	−3,668 (22,854)	−6,584 (19,074)
Pre-treatment outcomes				
Financial progress	−0.12	−0.07 (0.11)	0.52** (0.22)	1.59*** (0.17)
Physical progess	0.33	0.03 (0.05)	0.09 (0.10)	0.13 (0.08)

Source: Authors' elaboration.
Notes: Panel A shows the proportion of attritors in the control and treatment group and the mean's difference for each outcome in each time period. Standard errors are shown in parenthesis. In panel B, each cell reports the mean's difference between the attritors and non-attritors for each baseline characteristic in each time period. All variables correspond to March 2018. Standard errors are shown in parenthesis.