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Advisor: Greta NASI

Co-Advisor: Maria CUCCINIELLO

PhD Thesis by

Juan Pablo RIPAMONTI

ID number: 3082775

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Essays on Transparency and Trust in Government

Juan Pablo Ripamonti

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Introduction

Trust in government is essential for the success of democratic governance, influencing policy compliance and economic stability, and serving as a measure for democratic health. The complex relationship between government transparency and citizen trust has attracted considerable attention from both scholars and practitioners. Despite extensive research, the literature presents numerous gaps and inconsistencies.

In my first paper, I conduct a systematic review of the literature to explore the relationship between government transparency and citizen trust. My analysis reveals that the impact of transparency on trust is not consistent and varies based on the research design. Observational studies frequently indicate a positive relationship between increased transparency and higher trust. However, a critical observation in my review is the prevalence of common source bias in these studies, which arises when the same sources or datasets are used to measure both transparency and trust, potentially leading to inflated or misleading correlations. In contrast, experimental approaches, which mitigate this bias, tend to show more ambiguous results. Furthermore, my review uncovers a significant gap in the literature: a limited focus on the act of government disclosure itself, with most studies concentrating on the processing of disclosed information by citizens.

To address this gap, for my second paper, I conduct a factorial survey experiment. Through this experiment, I examine the effects of the act of government information disclosure, considering different factors that may characterize such disclosure, such as the type of information, the type of organization, and the perceived motivation to disclose. This methodological approach allows me to dissect how these different factors interact with each other, producing varying effects on transparency.

In my third paper, I turn to a novel approach for measuring public trust in government, trying to address the limitations inherent in traditional survey methods such as high costs, and infrequent data collection. Focusing on Twitter, I employ machine learning techniques to analyze the content of tweets mentioning specific government entities. This method al-

lows me to infer the trust levels of Twitter users based on their tweets. Although the findings suggest only modest correlations between these new indicators and traditional survey measures, they might be useful within certain demographics based on age and gender. The results demonstrate that while social media-based indicators have their limitations, they might also provide valuable supplementary data to traditional methods. This approach highlights the potential of using social media data as an additional tool for measuring public trust, yet it also underscores the need for cautious interpretation and further research to refine these techniques.

In summary, this dissertation contributes to the ongoing discourse on the relationship between government transparency and citizen trust. By examining existing literature, implementing a factorial survey experiment, and exploring the use of machine learning on Twitter data, this research seeks to fill identified gaps and add new dimensions to the existing body of knowledge. The findings from these studies provide incremental insights, potentially useful for both academics and practitioners. This dissertation, while making modest contributions, highlights the complexity of this subject and suggests avenues for future research and practical application in the public administration field.

1 Government Transparency and Trust. A Theoretical Framework and a Systematic Review of Empirical Studies.

Government Transparency and Trust. A Theoretical Framework and a Systematic Review of Empirical Studies.

Juan Pablo Ripamonti

September 2023

Abstract

Citizens' trust in government is a fundamental prerequisite for good governance. There exists a debate on whether trust can be bolstered through government transparency or if transparency might actually diminish trust. In this article, I aim to reconcile these divergent theoretical stances by elucidating the primary pathways through which transparency can impact citizens' trust. I undertake a systematic review of the empirical literature to ascertain our current understanding of these pathways. The review's findings suggest that existing empirical research only addresses a subset of these pathways, and there is a lack of consensus among these studies on whether transparency fosters trust. Furthermore, the empirical literature largely neglects the potential variability in the effects of transparency on government trust across different social groups, which could result in a polarization of trust. These findings bear significant implications for practitioners aiming to enhance citizens' trust and for scholars interested in the outcomes of transparency and the precursors of citizens' trust.

1   Introduction

Trust in government is deemed a vital prerequisite for effective governance. Evidence suggests that citizens who trust their government are more likely to comply with policies (Im et al., 2014), fulfill their tax obligations (Braithwaite & Levi, 1998), and exhibit greater trust in their fellow citizens, thereby reducing economic transaction costs and enhancing overall productivity (Fukuyama, 1995). The ongoing Covid-19 pandemic has underscored the significance of trust in government, as it influences citizens' adherence to preventive measures (Saechang et al., 2021) and their willingness to get vaccinated (Lazarus et al., 2021). As a result, the social sciences devote considerable attention to identifying factors that influence trust in government.

Numerous scholars posit that transparency is a key factor influencing trust. Conversely, others argue that transparency can actually diminish trust in government, while some maintain that transparency has no significant impact on trust. Empirical research supports all

three viewpoints (Cucciniello et al., 2017). Consequently, for practitioners aiming to enhance citizens' trust in government, the role of transparency remains uncertain.

Why does government transparency sometimes bolster citizens' trust, at other times weaken it, or appear to have no relation to it at all? Are there contextual factors that condition this relationship? How exactly does transparency influence trust in government?

I aim to address these questions through three approaches. First, I conduct a systematic review of empirical studies, analyzing the influence of government transparency on public trust in relation to various contextual factors, such as the object of trust and level of government. Second, I identify and synthesize the different theoretical mechanisms by which transparency is expected to influence trust into a unified theory. Third, I reanalyze the empirical evidence from previous studies for each of these mechanisms.

Before proceeding, I will define 'transparency' and 'trust' to provide clarity on the questions and objectives of this article. 'Transparency' is defined as the quality of an organization that makes information about its resources, processes, outputs, or outcomes accessible to external actors. These actors can use this information to evaluate the organization or its members. This definition is based on Grimmelikhuijsen's definition (Grimmelikhuijsen, 2012) and Heald's use of 'transparency' in the context of public service delivery (Heald, 2012, p. 30).

Trust' is defined as 'the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another' (Rousseau et al., 1998). Thus, citizens' trust in government reflects their willingness to accept vulnerability, grounded in their positive expectations of the government's intentions or actions. The 'government', as the object of trust, can refer to the entity as a whole, or any specific component: the executive and legislative politicians, the judiciary, the civil service and its administrative components (Bouckaert, 2012), a specific branch (executive, legislative or judicial), level (local, state, national), or even specific public organizations or publicly owned firms.

2   Empirical Literature Review

To address the research questions, I first carry out a systematic literature review. I employ the methods recommended by the '2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) statement. Originally designed for reviewing the effects of health interventions, these methods are also applicable (and widely utilized) for social

PRISMA 2020 flow diagram for new systematic reviews which included searches of databases, registers and other sources
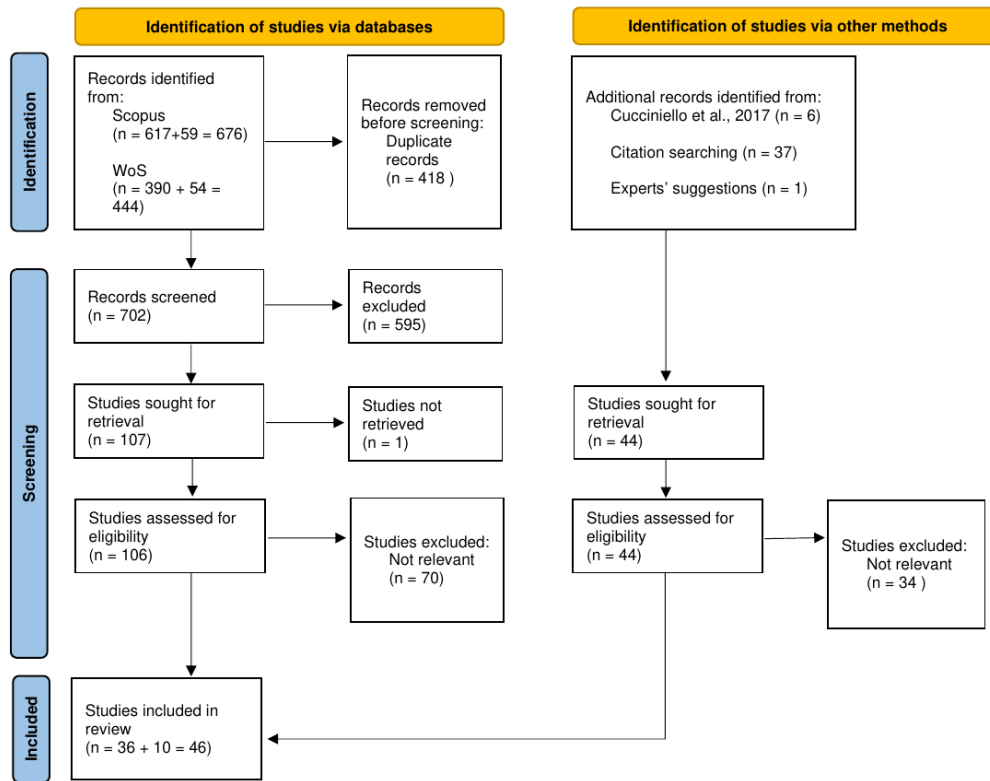

Figure 1: Caption here

interventions (Page et al., 2021). By using 'explicit methods to identify, select, and critically appraise relevant research' (Moher et al., 2009), I aim to facilitate replication, enhancement, and evaluation of my approach by readers.

To ensure the quality of the material reviewed, I limited my examination to peer-reviewed journals and books. The material was also restricted to publications in English since 1995. This starting date was chosen because it marks the beginning of transparency research (Cucciniello et al., 2017). The English language was chosen for convenience.

The main sources of citations are Elsevier's Scopus and Clarivate's Web of Science databases; both last searched on 25th July 2021. As supplementary sources, I drew from a recent literature review on transparency research (Cucciniello et al., 2017), a manual citation search, and experts' suggestions. Detailed steps are described below.

The search and selection strategy was implemented as depicted in Figure 2. The process of identifying records through citation databases started with the input of two search

arguments into each database (Web of Science and Scopus). The first search argument requested all records whose title or abstract contained the pair "transparency" and "government," or any of the terms "public sector transparency", "administrative transparency", and "transparent government" (same as Cucciniello et al., 2017), plus any of the words "trust," "trustworthiness," and "confidence".[1] This first argument returned 390 records on the Web of Science and 617 on Scopus. The second argument was less stringent in terms of words but limited the results to a subset of main outlets. It requested records whose title or abstract contained any of the words "transparency" or "transparent" and any of the words "trust," "trustworthiness," or "confidence" from a set of 13 key academic journals.[2] This search returned 54 records on the Web of Science and 59 on Scopus.

The search outputs were compiled into a single list of records together with the relevant records identified in a previous literature review (Cucciniello et al., 2017).[3] Many of the records in this list were repeated, so they were removed. The resulting list of unique records was then screened based on records' abstract. If an abstract showed a work was unambiguously irrelevant, the corresponding record was removed. Otherwise, the study was sought for retrieval. All retrieved works were then assessed for eligibility based on their contents. If the article, book, or book chapter did not hold any empirical evidence on the influence of transparency on trust, it was excluded from the list (see Appendix for the list of excluded records). The process described above resulted in a list of unique, relevant, studies (List A). Incidentally, none of these studies had been published in books so they were all journal articles. To increase exhaustibility, the articles in List A were examined to identify additional references to other works empirical works. The referenced works were then compiled in an additional list (List B). Many of the works on List B were not journal articles, books, or book chapters, so they were excluded. The remaining studies were assessed for

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[1]The word "e-government" was deliberately not part of the arguments. Although modern transparency is mainly computer-mediated transparency (Meijer, 2009) and therefore nearly a subset of e-government interpreted as the electronic provision of information and services (Norris and Moon, 2005), e-government encompasses government characteristics unrelated to transparency. Therefore, including e-government would have returned numerous irrelevant studies. Since the search procedure included of additional steps to guarantee exhaustibility, it was considered unnecessary. Needless to say, no study was excluded for being related to e-government as long as it showed empirical evidence on the link between transparency and public trust.

[2]The list of key academic journals was crafted by Cucciniello et al. (2017) for their review on transparency research. The journals are Administration and Society, American Review of Public Administration, Governance, Government Information Quarterly, Information Polity, International Journal of Public Administration, International Public Management Journal, International Review of Administrative Sciences, Journal of Public Administration Research and Theory, Policy and Internet, Public Administration, Public Administration Review, and Public Management Review.

[3]The review conducted by Cucciniello et al. (2017) was not strictly about the influence of transparency on trust but on outcomes of transparency in general, so the "relevant" records which were included were only those that the authors identified as being relative to the influence of transparency on trust in government

eligibility, and only the relevant were kept. List A and List B were then combined into the final sample. This final sample was then shared with experts on the topic. The experts were asked about potential missing relevant works. As a result of their suggestions, one more article was appended to the final sample.

Data collection was carried out using a spreadsheet, with each record/study represented by a row and each data item by a column (the spreadsheet can be found in the Appendix).The data items included characteristics of the publication (such as the year of publication, title, and authors' names) and characteristics of the study (including the geographical setting of the empirical research, type of data source, conceptual and operational definitions of transparency, type of information disclosed, transparency instrument, conceptual definition of trust, and the object of trust). A complete list of collected study characteristics —including those not used in the analysis— is available in the Appendix.

3 Results

3.1 Features of the literature

The final sample consists of 46 studies which are all journal articles. No relevant studies were found in books. The journal which published most articles was Public Administration Review (5), followed by International Review of Administrative Sciences (3). The rest of the outlets hosted, at most, two studies (see Appendix for a full list).

The topic has been gaining attention in recent years (see Figure 3.1). The first empirical study dates from 2002, seven years after the initial searching date. Since 2010, the topic has received increased attention, reaching its peak in 2020 and 2021, years in which the number of publications more than doubled with respect to the precedent years. Despite 2021 accounts for little more than half a year, it is the most prolific year. Most probably, this extraordinary increase is due to the Covid-19 pandemic since almost half of the articles are related to it.
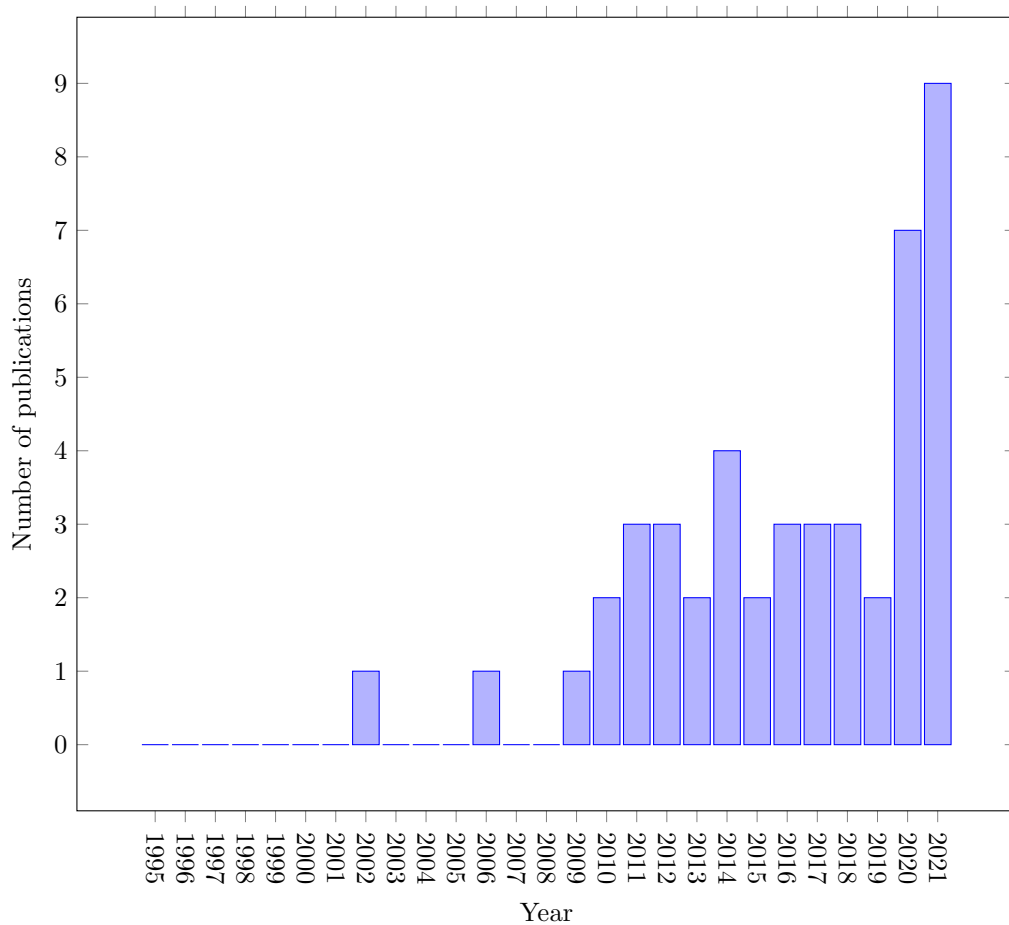
The final sample is biased in many ways, and it has several shortcomings. Concerning the geographical setting, there are seven cross-country studies. The rest are focused on one country: mainly, the USA (7), the Netherlands (7), South Korea (5), and China (4).[4] One noticeable gap is that developing countries are understudied (see Appendix for a complete list of the number of studies per country).

Another shortcoming regards the research strategy. It is well known that public administration research tends to favor quantitative over qualitative strategies (Ospina et al., 2018). The topic in this review is no exception to this tendency. Out of 46, only 4 studies employed a qualitative strategy, none of which were published in any public administration journal. In addition, there are no mixed studies.[5].

Research designs are essentially cross-sectional (32) and experimental (13 experiments and 1 natural experiment). Regarding the source of data, 31 use primary data produced

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[4]One study (Grimmelikhuijsen et al., 2013) produced two experiments in two countries (South Korea and the Netherlands). This study was coded as cross-country

[5]There is a mixed study (Enria et al., 2021), but the part relative to transparency and trust was qualitative only.

Type of information	Number of studies
Indefinite	5
Inputs	4
Multiple	4
Other	7
Outcomes / outputs	7
Policies	6
Process / Decision-making	9
Unknown	4
Total	**46**

Table 1: Studies by Type of Transparency

almost exclusively through surveys while 15 draw upon secondary sources. None employed a combination of both.

A noteworthy shortcoming in the literature is that many studies do not provide conceptual and operational definitions. Among quantitative works, one-third do not define at least one of the two concepts, while almost a quarter lacks one of the two operationalizations. In addition, some articles offer unclear definitions.

Through transparency practices, different types of information can be made available. In line with the definition of transparency presented above, I identify four types of transparency based on the nature of the information: input, process/decision-making, policy, and output/outcome. "Process / Decision-making" transparency attracted the widest attention, but all types of transparency are examined by at least four studies (see Table 3.1). A few studies use more than one type of information in their operationalization of transparency (see "multiple" in Table 3.1). Other studies operationalize transparency using information that does not fit any of the categories above. Although this implies they are not strictly about transparency they were not excluded since they could still provide some insights.

The object of trust is another relevant factor for understanding if and how transparency influences to trust. The effect of making government information available could be very different on trust in a specific government organization, the judiciary, or an abstract entity such as "the government". For example, process/decision-making transparency has shown to produce increased transparency in the judiciary and decreased trust in a local legislature (Grimmelikhuijsen, 2010; Grimmelikhuijsen & Klijn, 2015). As shown on Table 3.1, most studies ask about trust in "the government" or trust in specific public organizations of the executive branch. Therefore, the influence of transparency on any object apart from these two remains understudied.

Objects of Trust	Number of Studies
Government	20
Government agency / organization	13
Judiciary / Judges	3
Legislature	1
Other	5
Politicians	3
Unknown	1
Total	**46**

Table 2: Studies by Object of Trust

Level of Government of Objects of Trust	Number of Studies
Local	20
Multiple	4
NA	1
National / Federal	18
Other	1
State	1
Unknown	1
Total	**46**

Table 3: Studies by Object of Trust's Level of Government

Organizing the literature into areas by combining the type of transparency (inputs, process/decision-making, policies, outputs/outcomes), the object of trust ('the government', government agencies or government organizations, judiciary, and the legislative branch), and the level of government (Local, State, National) reveals several gaps. In Table 3.1[6], I present the number of studies per area. The unstudied areas are marked 'X'.

For instance, there is nothing about trust in any kind of government entity at the state level for any of the main types of transparency. Also, the influence of transparency of inputs on anything but "government organizations" at the national level has not been studied. Other noteworthy gaps are the effect of transparency of policies and outcomes or outputs in trust in the object "government" at the national/federal level, and the influence of transparencies of anything but process/decision-making on trust in "Legislatures".

Apart from the unstudied areas of the influence of transparency on trust, it is also relevant to identify understudied areas. Defining an understudy area in the most conservative way (only 1 study) reveals several additional gaps. For example, process and policy transparency at the local level of "the government", and inputs and processes transparency for the same

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[6]This table only shows the main types of information and objects of transparency. The full table is available in the Annex.

Transparency Object	Government			Government agency / organization			Judiciary / Judges	
	Loc.	St.	Nat.	Loc.	St.	Nat.	St.	Nat.
Inputs	X	X	1	X	X	X	X	X
Process	1	X	1	3	X	2	X	2
Policies	1	X	X	2	X	5	NA	NA
Outcomes / outputs	2	X	X	4	X	1	X	1

Table 4: Studies by Type of Transparency and Object of Trust

Transparency Object	Government			Government agency / organization			Judiciary / Judges	
	Loc.	St.	Nat.	Loc.	St.	Nat.	St.	Nat.
Inputs	X	X	1	X	X	X	X	X
Process	X	X	X	3	X	2	X	2
Policies	X	X	X	2	X	4	NA	NA
Outcomes / outputs	2	X	X	4	X	1	X	1

Table 5: Reliable Studies by Type of Transparency and Object of Trust

object at the national level.

Another important shortcoming of the literature is that several studies obtain the two variables of interest from the same source. This could lead to frequent issue in public administration research: common-source bias (Favero & Bullock, 2015). The issue in essence is that, when the source of the explanatory and explained variables is the same, their error terms could be correlated, which could lead (and often does) to false positives. In other words, when we asks citizens if they think the government is transparent and how much they trust the government, their personal characteristics (for instance, being pessimistic or optimistic) could make them perceive both, trust and transparency, more positively (or negatively), which could inflate positive results and ——what is worse—— erroneously suggest a significant relationship of the two variables (For instance, see Beshi & Kaur, 2020).

Common-bias does not mean that we cannot gather two variables from the same source, but when we do, additional procedures should be followed to minimize the probability of this bias to taint the results. Out of 20 studies which gathered both variables from the same source, only one (Porumbescu, 2017) followed one or more of the recommended strategies to confront common-source bias (See Favero & Bullock, 2015, for a description of reliable strategies). Therefore, the results from the other 19 studies are not reliable.

Excluding the articles which gathered the two variables from the same source without addressing common-source bias from Table 3.1, produces Table 5. This table offers a more

Effect on Trust	Cross-sectional		Experimental		Total	
Mixed	31%	4	29%	4	30%	8
Negative	23%	3	21%	3	22%	6
No Effects	8%	1	14%	2	11%	3
Positive	38%	5	36%	5	37%	10
Total	**100%**	**13**	**100%**	**14**	**100%**	**27**

Table 6: Effects of Transparency on Trust by Research Design

barren picture of unstudied areas. For instance, the object government at the local level is only addressed by studies of transparency of outcomes and outputs. In addition, the object government at the national level is only addressed by a study of transparency of inputs.

In the next section, I analyse the collection results from the literature on the influence of transparency on trust in government. The 19 studies mentioned above, which gathered data from the same source and did not address common-source bias, were excluded. Doing otherwise would have tainted the the analysis with ungrounded optimism. As an illustration, 90% of the studies in the excluded subset show a positive effect of transparency on trust and none exhibits negative effect. As shown below, such optimism contrasts the ambiguous effects found by the other studies.

3.2   Effects on trust in government

Overall, the 27 studies included in this analysis offer an ambiguous yet slightly positive picture of the effects of transparency on trust in government. Ten studies find evidence of a positive relationship; 8, mixed; 6, negative; and 3, of no relationship (see Table 3.2). This results are not contingent on research strategy. The few qualitative studies in the sample also show mixed outcomes overall: 2 mixed results, one positive, one negative (see Table 7).

Since transparency seems to have an ambiguous influence on trust overall, it is vital to see if such ambiguity also characterizes each kind of transparency or if, on the contrary, different types of transparency have homogeneous relationships to trust. In the following subsections, I analyze if this is the case.

3.2.1   Effects of transparency of inputs

Transparency of inputs is addressed by four articles. Half found negative effects, and half positive effects on trust (see the first column on Table 8).

In one study, the authors of Cook et al. (2010) mailed Social Security statements to

Transparency effect on Trust	Qualitative		Quantitative		Total	
Mixed	50%	2	26%	7	33%	9
Negative	25%	1	22%	5	22%	6
No Effects			13%	2	7%	2
Positive	25%	1	39%	9	37%	10
Total	**100%**	**4**	**100%**	**23**	**100%**	**27**

Table 7: Effects of Transparency on Trust by Research Strategy

Transparency effect on Trust	Inputs	Process / Decision-making	Policies	Outcomes / outputs
Mixed				4
Negative	2	3	2	2
No Effects		3	2	1
Positive	2	3	2	2

Table 8: sadfa

participants to evaluate its impact on their trust in the Social Security system[7]. The results indicated that providing such information improved citizens' knowledge and subsequently their trust. In another study, Alt et al. (2002) observed that governors in states with higher fiscal transparency tended to have higher approval ratings.

One of the articles that reports an adverse influence on trust is based on a cross-country quantitative study. In this research, Brusca et al. (2018) found that national governments with more budget transparency were also less trusted. However, it is unclear if transparency makes governments less trusted or, on the contrary, if less trustworthy governments make their budgets more transparent in an attempt to gain trustworthiness. The other study about input transparency that describes adverse effects is Chimonas et al. (2017). The authors conduct several focus groups with US physicians to investigate the outcomes of a transparency policy that discloses payments from pharmaceutical corporations to physicians[8]. Many interviewed physicians argued that disclosing such information damaged patients' trustworthiness. Although this is an interesting perspective, it might not be without a bias. In addition, the effects of such policy on trust in the healthcare system or the public health regulatory agency were not addressed.

In summary, the relationship between transparency of inputs and trust seems ambiguous overall. Input information about the pension system produced positive effects while health

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[7]More specifically, their belief that the "Social Security retirement benefits will be available when they retire" (p. 410 Cook et al., 2010).

[8]Although physicians in this study were not necessarily public workers, the insights of this study might be of relevance for the public health sector.

input information produce damaging effects, at least on the physicians. Fiscal transparency appears to increase trust at the state level and decrease it at the federal/national level.

3.2.2   Effects of decision-making / process transparency

Nine studies focused on process / decision-making transparency. Overall, they also show an ambiguous link in terms of results: 3 were positive, 3 negative, and another 3 found no effects (see the second column on Table 8).

The studies which found positive effects were two Dutch experiments and one cross-sectional cross-country study. One of the experiments revealed that transparency of regulatory enforcement decisions bolsters trust in regulatory agencies (Grimmelikhuijsen et al., 2021). The other experiment suggests that learning about how the judiciary works might strengthen citizens' trust in judges and the judicial institutions (Grimmelikhuijsen & Klijn, 2015). The cross-sectional study was also about the judiciary. By analyzing data from 111 jurisdictions, it concluded that jury systems and citizens' trust in the judicial system are positively correlated (Liu, 2018). However, it is unclear if the mechanism behind this correlation is any other characteristic of the jury system (such as participation) or if there are confounding factors.

The studies which found negative effects were experiments in The Netherlands, Sweden, and South Korea. The Dutch experiment investigated the disclosure of literal transcriptions of the deliberations of a local council. It found that when citizens received more information about the deliberation process, their trust in the council decreased(Grimmelikhuijsen, 2010). In the Swedish experiment, participants were presented with information about the decision-making process of priority settings in public health care. It finds that transparency weakens citizens' trust in health care (de Fine Licht, 2011). The Korean experiment found that showing people information about decision making-regarding identity theft policy negatively affected trust in government (Grimmelikhuijsen et al., 2013). The experiments that found no effects were conducted in the Netherlands and in Sweden. In the Dutch study, a group of people was shown information about decision-making of environmental policies. The authors found no statistical difference in the levels of trust between this group and control groups (Grimmelikhuijsen et al., 2013). In the two experiments conducted in Sweden, people were shown information about decisions and the decision-making process relative to two policy fields: public culture and leisure promotion, and traffic security. The author found no

significant effects of transparency on trust in neither experiment (de Fine Licht, 2014).

In sum, as it is the case for transparency of inputs, the influence of releasing information about process or decision-making on trust seems also ambiguous. Judicial transparency strengthened trust, while legislative and Public Health transparency hindered it. In topic areas such as environmental policy, leisure, culture, and traffic security, transparency did not produce any effect. Although it could also be that process transparency is unrelated to trust in local government organizations since environmental policy, leisure, culture, and traffic security were all studied at the local level.

3.2.3   Effects of transparency of policies

Regarding policy transparency, there are 6 studies in total which overall show an ambiguous effect on trust: two positives, two negative, two no effects (see the third column on Table 8). The studies which found positive effects are one qualitative study and one experiment. In the qualitative study, 25 US citizens were interviewed to understand factors behind trust in public health authorities in the context of a public health crisis. It was found that different aspects of transparency such as timeliness, completeness, and clarity of information were crucial factors (Holroyd et al., 2020). In the experiment conducted in the Netherlands, a treatment group was exposed to policy information relative to air quality policy. Those who received the treatment showed increased trust in the government (Grimmelikhuijsen, 2009).

The studies which found negative effects are two experiments, one conducted in the USA and the other in South Korea. In the American experiment, the treatment group was exposed to information about the Freedom of Information Act. This group exhibited a small but negative effect on trust vis-à-vis the control and placebo groups (Grimmelikhuijsen et al., 2020). In the Korean experiment, a group of participants were shown information about policy measures against identity theft. The treated group had less trust in government than the control group (Grimmelikhuijsen et al., 2013).

Two studies reported no significant effects on trust: one conducted in the Netherlands and the other in the USA. In the Dutch study, participants exposed to environmental policy information did not exhibit a significantly different level of trust in the environmental agency compared to a control group. The American study utilized a four-arm experimental design—one control and three treatment groups. While one treatment group was informed about the open government initiative, data.gov, the other two groups received information

regarding the Freedom of Information Act, albeit presented in different ways. None of these treatments yielded significant effects on trust in government (Grimmelikhuijsen et al., 2020).

Policy transparency is also ambiguously related to trust. Regarding the topic of the information, transparency of air quality policy produced increased trust in one experiment and no effects in the other, although they were conducted in similar environments. Transparency of Freedom of Information Laws, also in similar experiments with samples of the same population, produced negative effects in one case and no effects in the other. The topics which did not produce ambiguous results on trust were public health policies and identity theft policies. Public health policy transparency produced increased trust, at least in a public health crisis, while identity theft policy information produced decreased trust.

If we look at the types of objects of trust separately, the link between transparency and trust remains ambiguous. We can identify two different subsets of studies on policy transparency: those on trust in local government organizations and those on national/federal government organizations. Both subsets show an ambiguous relationship between policy transparency and trust.

3.2.4   Effects of transparency of outcomes and outputs

Regarding transparency of outcomes and outputs, there are nine studies in the sample, all but two experimental. Two studies found positive results; one, negative; four, mixed; and two, no effects. In one of the studies which found positive results, Mason et al., 2014 measured levels of trust in the police department before and after exposing participants to positive outcome information. They found that positive outcome information has a positive effect on trust. In the Dutch experiment, Grimmelikhuijsen, 2012 finds that transparency of outcomes related to air pollution produces a positive effect on perceived competence, a dimension of trust. Interestingly, the outcome being positive or negative does not affect trust.

The experiment which found negative results was also conducted in The Netherlands. In this experiment, people were asked to read messages about environmental policy outcomes with different degrees of spin: (a very positive message, a positive message, and a slightly balanced message). It was found that the slightly balanced message affected trust negatively, compared to the positive messages (Grimmelikhuijsen, 2011). However, there was no control group in this experiment, so it shows the effect of different degrees of spinning instead of the

effects of the messages themselves. The other study used Chinese data. It found a negative correlation between transparency, measured by disclosure rates of court decisions, and trust in the judiciary. However, the interpretation is not necessarily that less transparency drives more trust since it is also plausible that more trustworthy jurisdictions have more leverage to remain less transparent (Tang & Liu, 2021).

The experiments which found mixed results were conducted in Argentina, The Netherlands, Ireland, and Korea. In the Korean experiment, citizens were exposed to positive and negative identity theft policy outcome information. It was found that positive policy outcome information had no significant effect on trust, while negative policy outcome information had a negative effect (Grimmelikhuijsen et al., 2013). In the Argentinean experiment, a group of citizens were shown a message about how the local government failed to achieve policy targets, while another group was shown a message about how the same government had attained its policy targets. The first group expressed less trust than the second group (Alessandro et al., 2021). However, this experiment used no control, so the results cannot be compared to not showing any message. In the Dutch experiment, participants were exposed to strong and weak transparency websites about air pollution policy outcomes. It was found that transparency had no effect on trust for participants with high previous knowledge on the matter. Also that the strong transparency website produced an increase in trust in government for participants with low previous knowledge and low general trust in government. Weak transparency also produced an effect ——although negative—— on participants with little previous knowledge and high general trust in government (Grimmelikhuijsen & Meijer, 2014). In the experiment conducted in Ireland, a group of participants was shown detailed information about outcomes of the government handling of the pandemic; another group was shown less information, and a control group received no information. Detailed information produced more trust among those who had previously high trust in the government, and it produced less trust among those who had prior low trust in the government (Crepaz & Arikan, 2021).

The study which found no effects was conducted in the Netherlands. Two treated groups were shown information about positive and negative environmental policy outcomes. None of these groups showed significantly different levels of trust compared to the control group. However, the negative outcome information group had significantly lower trust than the positive outcome group (Grimmelikhuijsen et al., 2013).

Outcome/output transparency also shows an ambiguous relationship overall. Transparency of positive outcomes of the police appears to bolster trust. Transparency of environmental outcomes also seems to produce trust, but more if the outcomes are positive than negative. And, when citizens have high previous knowledge on the matter, the effects seem to dim, while when they have low previous knowledge and trust in government, the effects seem to augment. Information on outcomes of identity theft protection policies produced no effects when the outcomes were positive and negative effects when they were negative. Pandemic-handling outcome information produced more trust among those respondents who had previous high trust and less trust among those who had low prior trust. General outcome information of the local government produced more trust when it was favorable than unfavorable. Finally, output information from the judiciary (court decisions) was linked to less trust.

3.2.5   Effects of other types of information on trust in government

Overall, making other types of information available also appears to produce ambiguous effects on trust. Of six studies, four showed mixed effects; one had no effects, and another was positive.

The only study which found positive effects is cross-country research. It reports a positive correlation between countries' Open Government Index (OGI) and trust in the "Public System" (an indicator based on trust in the parliament, the legal system, the police, the politicians, and the political parties). They found that countries with higher trust in the public system score higher in the OGI, controlling for other factors, such as democratic capacity, gender, age, education, political interest, political attitude, political activity. Additionally, they found that "democratic capacity", which is citizen's perception that they can influence the governance system through democratic political channels, acts as a mediator (Schmidthuber et al., 2021). The articles which reported evidence of mixed-effects were two qualitative studies made in the UK and two quantitative studies, one cross-country and another in South Korea. In one of the qualitative studies, Worthy, 2013 digs into the opinions of Freedom of Information officials and other individuals. Some felt FOI laws had increased trust, others that it did not. The other qualitative research investigates citizens' perceptions of UK government's Covid-19 response. The authors found that many respondents support the government's lack of transparency. In contrast, other groups did not trust

the government because of transparency in handling the pandemic. Others who did not trust the government because of pre-pandemic experiences were inclined not to trust how the government handled the pandemic. (Enria et al., 2021).

The Korean study analyzed the links between the use of government social media and government websites and perceptions of government trustworthiness. Although the two independent variables are related to information about the government, they are not linked to information that can be used by an outside party to assess the inner workings of the government or a government organization. In other words, the independent variables do not fall entirely in transparency, as defined earlier in this review. The author found that using public sector social media was related to positive perceptions of government trustworthiness. Also that using an e-government website was not significantly related to government trustworthiness (Porumbescu, 2017).

The last study, which found mixed effects on trust, examined the link between the World Bank's Economic and Institutional Transparency Index and trust in institutions (a measure based on trust in civil service, judiciary, and government) in 53 countries. Overall, they found no statistically significant link between the two. However, in countries with higher levels of control of corruption (less corrupt countries), transparency showed a negative link with trust (Bauhr & Grimes, 2014).

The only study which found no effects on trust examines the relationship between transparency as measured by several indicators (such as Access to Information Requests, GOD index, and OECD ranking in open government) and Eurobarometer's trust in government. The authors find no relationship between these variables (Mabillard & Pasquier, 2016).

3.2.6 Effects of transparency on trust by other criteria

The effects of transparency on trust can also be arranged according to other criteria, such as the region in which the study was conducted, the level of government (national/federal or local). All of these arrangements show that the link between transparency and trust is also variable. Transparency sometimes produces more trust, sometimes less, and sometimes nothing.

To sum up, contextual factors are sufficient conditions to modulate the influence of transparency on trust in a positive or negative way. The same goes for objects of trust and levels of government. However, this does not mean they are unrelated to trust outcomes of

Effect on Trust	Asia	Europe	US	N/A	Rest of America	Total
Mixed	1	4	1	2	1	9
Negative	1	3	1	1	0	6
No Effects	0	1	0	1	0	2
Positive	0	5	3	2	0	10
Total	**2**	**13**	**5**	**6**	**1**	**27**

Table 9: Effects of Transparency on Trust by Region

Effect on Trust	Local	NA	National / Federal	Other	State
Mixed	4	0	3	1	0
Negative	2	1	6	0	0
No Effects	5	0	2	0	0
Positive	3	0	6	0	1

Table 10: Effects of Transparency on Trust by Level of Government

transparency, as it was shown in previous studies(e.g. de Fine Licht, 2014).

In the next section, I examine different ways in which the disclosure of information has been considered to affect citizens' trust as well as the extent to which the empirical literature has addressed such channels.

4 How does transparency influence trust?

The influence of transparency on trust in government appears to be ambiguous even when considering the contextual factors analyzed above. Such ambiguity bears the question of how transparency influences trust, when it does. In order to identify the mechanisms of influence of transparency on trust, I will survey the literature. This analysis allows me to identify different channels of influence. I start with the channels that are more likely to show an effect in the short run and continue with those that are more likely to show an effect later. To simplify the exposition, I will provisionally ignore the possibility of transparency producing more trust in some citizens while less trust in others.

Effect on Trust	Gov.	Agency	Jud.	Leg.	Oth.	Polit.
Mixed	4	3	0	0	1	0
Negative	1	4	1	1	2	0
None	1	6	0	0	0	0
Positive	1	4	2	0	2	1

Table 11: Effects of Transparency on Trust by Object

4.1   The signalling mechanism

The first channel of influence identified in the literature can be called "signalling". It comes from the fact that when a government entity makes (or announces to make) information publicly available, it signals that it has "nothing to hide" and abides by the norms of "good" governance. Such signals may be interpreted by citizens as manifestations of honesty and benevolence (two common operational components of trust) producing increased trust in government (Crepaz & Arikan, 2021; Grimmelikhuijsen, 2012).

The signalling mechanism was not studied separately in any of the articles. This means it could partially cause the influence of transparency on trust for all of the reviewed studies.

4.2   The consumption of information

Another channel identified in the literature relates to the consumption of information. The consumption of information is said to increase citizens' trust because it can make them become more familiar with the government (Tolbert & Mossberger, 2006; Grimmelikhuijsen & Klijn, 2015; Nye et al., 1997), better understand policy motivations (Brusca et al., 2018; Estrada & Bastida, 2020; Hood & Heald, 2006), and better appreciate government efforts (Alt et al., 2002; Porumbescu, 2017). However, consuming information can also have a detrimental effect on trust since it can expose citizens to government limitations (Cook et al., 2010) and mistakes (Grimmelikhuijsen, 2009), muddy bargaining processes (Grimmelikhuijsen & Klijn, 2015), present decision-makers as immoral (de Fine Licht, 2011), and end up disenchanted (Grimmelikhuijsen, 2011).

All of the mechanisms related to consumption of information are plausible and there is no reason why they could not operate simultaneously. The positive mechanisms are often related to unmediated consumption of information and the negative mechanisms are often related to mediated consumption of information.

there is nothing inherently trust enhancing about consuming government information. Information can be consumed directly through government websites and social media or through third party outlets, such as TV, newspapers, and the like

4.2.1   The unmediated consumption of information

When citizens consume government information, they might change how they feel about the government. If they find the information to be above their expectations, they might end up

trusting the government more. If they find the information to be below their expectations or at the level of their expectations, they might end up trusting the government less or the same; (Bovens, 2003, as cited in Grimmelikhuijsen, 2010; O'Neill, 2002). In other words, the mismatch between citizens' expectations ——even if such expectations are tacit and undetermined—— and their actual perceptions of the information and its source can determine if citizens end up trusting the government more, less, or the same.

4.2.2 The mediated consumption of information

Most citizens do not invest much time in going through public procurement data, homicide rates, and public meetings' transcripts. Instead, they consume government information mediated by newspapers, TV news, social media, and other media outlets. Needless to say, such outlets frame government information in different ways which are mostly beyond government control, at least in democratic countries. This framed information can also influence citizens' trust. Many authors warn that the spread of such information would be negatively biased and therefore would lead to decreased trust in government (O'Neill, 2002)

An extreme case of negative reception of information via media outlets are scandals. Several authors warn that government transparency can feed a politics of scandal or at least a bias towards negative outcomes since it becomes easier for external actors to point out mistakes and corrupt practices. When citizens learn about such mistakes and misuse of office, they can lose their trust in the government.

4.3 The government channels

Transparency might also influence how citizens feel about the government because it can change how the government works (Meijer, 2013). If the government improves, and citizens recognize this, they might trust the government more (Kim, 2005).

4.3.1 The change of conduct of public officials and politicians

One of the changes that transparency might trigger in the government is that it could deter public officials and politicians in office from misusing public office for personal gains. Such a thing could happen if, as a result of transparency practices, officials and politicians are deterred from engaging in corrupt practices. If so, the government could improve its outputs, providing better public services. If citizens perceive such improvement their trust

in government might increase (Christensen & Lægreid, 2005; Van de Walle & Bouckaert, 2003).

However, the way public officials change their behavior due to transparency policies is not necessarily trust-enhancing. When people believe most of what they do can reach the public, they could become less honest and massage the truth. For example, "public reports may underplay sensitive information; head teachers and employers may write blandly uninformative reports and references; evasive and uninformative statements may substitute for truth-telling. Demands for universal transparency are likely to encourage the evasions, hypocrisies, and half-truths that we usually refer to as 'political correctness', but which might more forthrightly be called either self-censorship or deception" (O'Neill, 2002).

4.3.2   Government responsiveness

The last channel through which transparency might lead to increased citizens' trust relates to government responsiveness. As mentioned in sections 4.2.1 and 4.2.2, when citizens access government information, they might learn things they do not like, and their trust might decline. However, this is not necessarily the end of it. The government can react to citizens' dissatisfaction and change (ideally) for the better. In other words, transparency allows the government to learn from its own mistakes and improve (Brin, 1999). If the government reacts quickly and satisfactorily, trust in the government could improve in the long run. However, if the government does not respond adequately, the effect on trust could be even worse.

5   Factors Complicating the Transparency-Trust Relationship

The relationship between transparency and trust in government is more complex than what the channels presented above suggest. This is because the way citizens react to government information is tied to their concerns and what they expect the government to do and to inform about. And citizens' concerns and expectations are different, sometimes contradicting, between groups of citizens. This is such that transparency could produce polarization of trust, strengthening trust in a group while weakening it in another.

On top of this, concerns and expectations might change over time. Citizens might be

indifferent to certain government information today and consider it to be crucial a year later. For example, information about crime could be unimportant in a city where crime is not a concern. But, if citizens perceive the crime to be rising, they might expect the government to produce and disclose crime statistics.

6   Discussion

The specific question that drove this review is: do contextual factors affect the relationship between government transparency and trust? I tried to answer this questions taking advantage of the mass of empirical literature that has been accumulating over two decades.

Overall, empirical research on transparency and trust in government suggests that there is an ambiguous relationship between the two. I arranged the evidence by different types of transparency (input, process, policy, output/outcome) to learn if outcomes diverge across transparency types. All types of transparency remain ambiguous in their relationship with trust. If we further disaggregate,that is, if we take the types of transparency together with the topic of transparency and the trustee, there is mixed evidence in two cases alone: local environmental policy transparency, which produced increased trust and insignificant effects in two similar experiments; and information about the Freedom of Information Act, which produced negative effects in one experiment and no effects on another. In other words, for a lower level of aggregation, all other combinations of transparency and type of information or trustee, the evidence is not ambiguous. For example, process transparency of the judiciary appears to strengthen trust according to two relevant studies, while output transparency seems to weaken it, according to one study; one study of input transparency at the state level is linked to increased trust while at the national level another study is linked to decreased trust. But at this level of granularity, coherence is based mainly on the lack of empirical studies. There is no conflicting evidence about, for instance, transparency of outcomes and police trust because there is only one study. Adding more evidence to all such combinations of types of transparency and topics could be a very demanding enterprise and perhaps sediment what we've found: that transparency and trust are tied irregularly.

I also tried to arrange the results of studies by geographical region, level of government, and object of trust. But none of these arrangements suggest anything different. There is nothing in any of the variables used to organize research studies that could have sufficient leverage such that most studies show homogeneous results. In other words, based on the

evidence accumulated by two decades of empirical research, there are no grounds to claim that transparency bolsters trust, nor that it hinders it, nor that they are unrelated. Not even for specific types of transparency, nor for a specific level of government, geographical region, or object of trust as used in this review.

The evidence used in this review was not without limitations. There were no longitudinal and very few qualitative studies. This is a relevant limitation because both are key to help us understand beyond the immediate relationship of transparency and citizens' trust. That is, they can show if and how transparency plays a role in complex dynamics that affect other desirable societal outcomes and also trust indirectly (Meijer, 2013; Michener, 2019; Pozen, 2020).

Most of the evidence used focused on developed countries. This is an essential limitation since there is evidence that cultural factors might play a role in how transparency affects trust (Grimmelikhuijsen et al., 2013).

Another shortcoming is that many studies lack or have unclear conceptual and operational definitions. This is problematic because the meanings of "transparency" and "trust" are not straightforward, even as technical concepts. That is, scholars do not always use such terms in the same manner. On top of this, both vocables are also common notions used by laypeople, which makes them even more ambiguous. This ambiguity can lead researchers to classify under the same heading and with the same explanation things that are actually unlike (Durkheim et al., 2013). Not having operational definitions is problematic for another reason. It prevents us from learning what indicators measure. Without such information accepting results of a study turns into an act of faith, opposite to the basis of a scientific approach.

Another issue in the literature is that nearly every study that collected both dependent and independent variables from the same source did not test for common-source bias. This implies that the results obtained from such studies may not be reliable. This limitation compelled me to exclude several studies from the analysis, resulting in a significantly smaller sample.

The way I arranged the evidence does not establish definitive links between the two social processes. For instance, even if I had found that all studies of a particular type of transparency were associated with increased trust, it would not have constituted conclusive evidence. However, it could have served as a valuable guide for future research. However, my

findings indicate that none of the contextual elements I analyzed are sufficient to engender trust in government.

The results send a warning message to scholars and practitioners who regard transparency as a means to achieve more trust in government. Transparency only sometimes leads to trust, and it is not entirely understood how. We need to understand better the mechanisms by which these two processes are related to gain some certainty about in which contexts transparency might lead to trust.

Understanding the mechanisms supposes digging into the different phases of the transparency process that could be linked to trust—starting with the announcement of the transparency policy, which could produce a positive (signaling) effect on the group of citizens and organizations that have a positive opinion of transparency (Berliner, 2014). Then, the contents of the information could have a positive effect on some citizens and negative on some others. For instance, some people could be pleased to learn how government does some job (process transparency) while some others could find it disappointing. Another stage comes after government information is shared. At some point, a scandal could be revealed as a result the disclosure of such information. Again, this could have divergent effects on trust in different groups of citizens. Afterwards, there is the way the government reacts to the scandal, which could also have effects on trust. For instance, if the government does not take any action after some corruption scandal, citizens' trust might decrease, while if it takes a course of action that the public approves, it might increase its trust.

All stages share that they could trigger differential trusting effects on different groups of citizens. Understanding the mechanisms through which transparency leads to different trust outcomes, requires to learn more about citizens. About why some react in a way different from others. One of the dimensions of this issue could be citizens' demand of government information and the dynamics of such demand. The demand of specific information is related to how relevant is the problem is for citizens. For instance, the decision criteria used for hospitalizations might be unrelated to trust in normal times, but during a pandemic it could be an important factor. And it could be relevant for some groups of citizens and not for others. For instance, during the Covid-19 pandemic, senior citizens could be very much worried about such decision criteria, while the young might not care at all.

All these stages relate to how transparency might directly affect citizens' trust. But limiting the link between transparency and trust to the direct effects of accessing govern-

ment information is myopic. Transparency can trigger change the behavior of many different actors, including the organization that makes the information available (Meijer, 2013). Understanding how transparency affects all relevant actors is also key to learn how it can affect trust and how such link might vary in different settings. In order to do this, the extensive scholarship on the topic should be complemented with additional qualitative research. Qualitative research could help to develop a better understanding of the mechanisms that could later be tested through quantitative research. Until then, scholars and practitioners should be cautioned not to attribute transparency any other link to trust than what evidence suggests, which is that the link is ambiguous.

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Appendix A   Results

Effect on Trust	Cross-sectional		Experimental		Total	
Mixed	16%	5	29%	4	20%	9
Negative	9%	3	21%	3	13%	6
No Effects	6%	2	14%	2	9%	4
Positive	69%	22	36%	5	59%	27
Total	**100%**	**32**	**100%**	**14**	**100%**	**46**

Table 12: Caption

2 Does Learning about Transparency Boost Citizens' Trust?

Does Learning about Government Transparency Boost Citizens' Trust? Exploring an Overlooked Mechanism.

Juan Pablo Ripamonti

November 2023

Abstract

Governments often implement transparency policies with the aim of enhancing citizens' trust. However, the effects of these policies are not completely understood. Existing literature primarily focuses on how citizens process disclosed information, while often overlooking the impact of the act of disclosure itself. To address this gap, this study investigates the public's response to the act of government disclosure, regardless of the content disclosed. Utilizing a conjoint experiment, the research varies the motivations, types, and levels of information disclosure across different organizations to assess their impact on public trust. Results indicate that disclosure in the domains of finance, public meetings, and performance significantly enhances perceptions of trustworthiness, particularly noting a substantial impact of performance transparency. Additionally, an interaction effect of financial and performance transparency is observed as significant. The study also reveals a moderating effect of citizens' value placed on transparency. These findings contribute to a broader understanding of the relationship between government transparency and public trust.

1   Introduction

Citizens' trust in government is linked with many positive outcomes, including increased productivity, compliance with policies, and reduced tax evasion (Fukuyama, 1995; Scholz & Lubell, 1998; Tyler, 2006). To strengthen trust, governments have often implemented various transparency policies and legislation. However, empirical studies conducted in the past reveal mixed outcomes from these efforts. Some research has identified positive effects on trust, while other studies have reported negative or negligible impacts (Cucciniello et al., 2017). Despite this mixed evidence, governments have continued to pursue transparency initiatives. The underlying causes of these varied outcomes are not fully understood, highlighting a need to better comprehend the mechanisms behind these results and the specific contexts in which transparency might either foster trust or, conversely, undermine it.

Government transparency can be defined as the availability of information about a public entity allowing external actors to monitor its internal workings or performance (Grimmelikhuijsen & Klijn, 2015). Most empirical studies on the effects of transparency on citizens' trust in government focus on how citizens react when they access certain government information (e.g., Grimmelikhuijsen et al., 2013 and de Fine Licht, 2014). Mainly through experiments, these studies provide valuable insights into the immediate reactions triggered by accessing the information that the government disclosed. However, because of the way transparency treatments are designed (e.g., specific data, websites, or reports) they entangle two intertwined mechanisms: the particular content of the government information and the mere act of the government disclosing this information (Grimmelikhuijsen et al., 2020). Take, for example, a citizen who may appreciate the availability of new performance data (the act of information disclosure), only to discover that the performance has been declining over time

(content of the disclosure). In other words, the act of information disclosure can shape perceptions about the government even before or without an individual engaging with the actual content. This crucial aspect of the influence of information disclosure remains under-researched.

Consequently, this article seeks to deepen our understanding of how the act of information disclosure influences citizens' trust in government, focusing specifically on the impact of various aspects of this process through a factorial survey experiment. The experiment manipulates the levels and types of information disclosed (such as Financial or Budget details, Public Meetings, and Performance information), the nature of the organization involved (comparing a Police Department with a Department of Sanitation and Environmental Services), and the extent of their compliance with the Freedom of Information Act. This manipulation aims to create different scenarios of information disclosure. The analysis then focuses on evaluating how these diverse scenarios, reflecting varying degrees and types of governmental transparency, shape citizens' perceptions of government trustworthiness.

This study's emphasis on examining the act of information disclosure, separate from the content, fills a gap in our knowledge of government transparency and trust. Distinguishing between the content of the information and the act of disclosing provides insights that may help policymakers and administrators design more effective transparency initiatives, thereby strengthening the relationship between government entities and the public.

The article proceeds as follows. I begin with a concise review of the literature on how government transparency affects citizens' trust, identifying the current gaps. Next, I detail the methodology, emphasizing the experimental approach and the factors examined. I then dig into the results and their implications. The article concludes with reflections on the findings and directions for future

research.

2   Literature Review

The academic literature has conceptually identified at least two different and relevant pathways through which information disclosure may influence citizens' trust: a knowledge-based mechanism and a disclosure-based mechanism (Crepaz & Arikan, 2023). The knowledge-based mechanism is the effect on individuals of consuming or processing government information, a notion mentioned in works such as Grimmelikhuijsen et al., 2013 and Alessandro et al., 2021. It has been hypothesized that as individuals consume government information, they can become more familiar with the government (Grimmelikhuijsen & Klijn, 2015; Tolbert & Mossberger, 2006), deepen their understanding of policy rationales (Brusca et al., 2018; Hood, 2006), and better assess government's efforts (Porumbescu, 2017), thereby influencing their views on government trustworthiness.

The second pathway, the disclosure-based mechanism, concerns the effect on individuals of observing the act of disclosure, without (necessarily) accessing the disclosed information. Scholars have highlighted that the act of disclosure itself—whether it is perceived as an indicator of having "nothing to hide" (Crepaz & Arikan, 2021), as a display of commitment to agreements (Abolafia & Hatmaker, 2013), or as evidence of good governance (Enria et al., 2021)—can serve as a signal that potentially affects citizens' perceptions of government trustworthiness.

For the most part, empirical studies in government transparency and trust have not explicitly identified specific mechanisms. However, exceptions exist, primarily adopting experimental approaches and focusing on the knowledge-based pathway. Examples of this research approach include the works of de

Fine Licht (2014), S. Grimmelikhuijsen (2011; 2012), and Im et al. (2014). These studies often operationalize transparency through simulated government channels, such as websites or messages conveying government-related information, including details on public policies or performance indicators. Yet, these operationalizations pose a challenge. They make it difficult to differentiate the principle of transparency, or the act of making information available, from the other elements that typically constitute transparency treatments (the specific data, websites, reports, or other information about the government) (Grimmelikhuijsen et al., 2020). In other words, these studies, which are focused on the effects of processing government information, inadvertently entangle two distinct transparency mechanisms: the effects of consuming government information and the effects of observing the act of transparency. As a result, they do not provide evidence of the independent effect of the act of disclosure on trust.

The research centered on the disclosure-based mechanism is scarce, but there are at least two empirical studies that have produced valuable insights. Grimmelikhuijsen's research (2012) examined the impact of information disclosure on trust mediated by knowledge. His study revealed that transparency's influence extends beyond citizens merely acquiring knowledge from the government. This finding is consistent with the idea that observing the act of disclosure influences trust, but it does not provide direct evidence of the influence of the act of disclosure as other factors such as the manner in which information is disclosed, the timing of disclosure, or the perceived sincerity and motivations behind disclosure—which are intertwined with the transparency operationalization—might also be influential.

The other valuable insight relative to the disclosure-based mechanism comes from an article by Grimmelikhuijsen et al. (2020). The authors conducted experiments in which they primed participants with information on the Freedom

of Information Act (FOIA) and the data.gov initiative. Interestingly, while conventional wisdom holds that citizens value information accessibility over secrecy (Nasi & Cucciniello, 2013; Piotrowski & Van Ryzin, 2007), being primed about these transparency policies did not improve perceptions of government trustworthiness, and in some cases, it even produced negative effects (Grimmelikhuijsen et al., 2020)[1]. The finding that being informed about transparency policies may not increase citizens' trust in government, and may even reduce it, raises some concerns because it challenges a fundamental assumption about the impact of the act of disclosure on trust. While there are plausible interpretations for these results, such as citizens' failure to see the value in these specific transparency policies like the Freedom of Information Act (FOIA) and data.gov, or as suggested by the authors of the study, the possibility that highlighting transparency evokes thoughts of corruption and inefficiency, these findings bear the question: Does the act of transparency influence trust, particularly considering the contextual factors of disclosure?

In this paper, I will analyze four factors that could moderate the impact on trust from observing the act of information disclosure: the type of information, the motivation to disclose, the organization involved in the disclosure, and the importance given to information disclosure.

Firstly, regarding the type of information disclosed, a cross-national experimental study, Grimmelikhuijsen et al., 2013 found that consuming different categories of government information—such as decision-making, outcomes, and policy details—sometimes yielded varying effects on trust. However, since this study focused on processing specific information, it remains unclear whether these differential effects arose from the concrete operationalizations employed

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[1]The study reports on the results of two experiments. The first experiment identified negative effects on public perceptions of government trustworthiness. The second, a refined iteration of the initial experiment, showed statistically insignificant effects on these perceptions.

in the study or from the distinct values that citizens placed on the type of information disclosed.

Secondly, turning to the motivation to disclose, social psychology literature establishes that individuals make inferences about actors' traits based on the interpreted motivations of their actions (Krull & Erickson, 1995; Reeder, 2009). Translating this to the public administration domain, when government offices disclose more information than required by Freedom of Information (FOI) laws, it could be perceived as a genuine motivation to share information, potentially enhancing citizens' trust. Conversely, merely meeting the disclosure requirements might not elicit the same perceived motivation. In the experiments reported by Grimmelikhuijsen et al. (2020), which show negative and neutral effects of transparency on trust, the two transparency groups (FOIA and data.gov) cannot be interpreted as displaying government motivation to disclose (at least from the organization) because the organization that disclosed the specific information through FOIA or data.gov did not craft these two policies, they just follow them. In other words, exploring the perceived motivation behind government's disclosure of information is key for a comprehensive understanding of how transparency policies influence citizens' trust.

Thirdly, I consider the organization involved in disclosing information. Previous empirical studies examining the consumption of government information have demonstrated that trust can vary across the specific policy area and organization (Crepaz & Arikan, 2023; de Fine Licht, 2014; Grimmelikhuijsen et al., 2021). These variations highlight the complexity of the relationship between transparency and trust when it comes to information consumption. Building upon this, this study seeks to explore whether these organizational factors also play a role in the act of observing information disclosure.

Finally, regarding the importance given to the information disclosed. Grim-

melikhuijsen (2012) found that the topic concern has a moderating effect of government information processing on trust. However, it remains unclear if this effect applies to the effect of observing the act of disclosure. Therefore, this study will also analyze the potential moderating impact of the importance attributed to transparency on the relationship between observing the act of disclosure and trust in government.

To summarize, this research tries to answer three central questions:

- How does the act of disclosure, on its own, influence perceptions of government trustworthiness?

- What impact do various disclosure factors, such as information levels and types, the involved organization, and disclosure motives, have on trust?

- How does the value citizens place on information disclosure influence its impact on their trust in government?

3 Research Design

To address the outlined questions, several hypotheses will be tested. The first set of hypotheses pertains to the research question "Is citizens' trust influenced by observing the act of information disclosure"? The initial hypothesis, based on theoretical expectations of the act of information disclosure (Hood, 2006; Tolbert & Mossberger, 2006), proposes a direct relationship between transparency and trust. In contrast, the competing hypothesis, drawing on findings from Grimmelikhuijsen et al. (2020), suggests that information disclosure may not always correlate with enhanced trust:

H1a (Positive Act of Disclosure Hypothesis): Learning about government transparency leads to a positive change in citizens' perceptions of government trustworthiness.

H1b (Ineffective or Negative Act of Disclosure Hypothesis): Learning about government transparency either does not affect or negatively affects citizens' perceptions of government trustworthiness.

This research also addresses the contextual factors of transparency, in response to the research question: "What characteristics of the act of information disclosure influence and moderate the effect of transparency on citizens" perceptions of government trustworthiness?

H2 (Voluntary Transparency Trust Hypothesis): Organizations that disclose more information than legally required are perceived as more trustworthy.

H3 (Transparency-Trust Variation by Organization Hypothesis): The effect of learning about government transparency on perceptions of government trustworthiness varies depending on the nature of the organization, such as between the Police Department and the Department of Sanitation and Environmental Services.

H4 (Transparency Interaction Effect Hypothesis): The effect of transparency on perceived trustworthiness is influenced by the interaction between different types of transparency (financial, public meetings, performance), where the impact of one type depends on the level of another.

Finally, the last hypothesis explores the role of the value citizens assign to information disclosure and its influence on how learning about acts of disclosure affects their trust in government. This exploration corresponds to the question: 'How does the importance citizens place on information disclosure affect the impact of the act of disclosure on their trust in government'?

H5 (Transparency Significance Hypothesis): The importance placed on transparency by individuals positively moderates the relationship between an organization's level of transparency and perceptions of government trustworthiness.

To test these hypotheses, a factorial survey experiment was conducted. Such

Table 1: Vignette Dimensions and Levels

#	Dimensions	Levels
1	Type of organization	Police Department / Department of Sanitation
2	Motivation to disclose	More than FOIA / As much as FOIA
	Level of disclosure of:	
3	financial information	Very limited / A lot
4	performance information	Very limited / A lot
5	open meetings information	Very limited / A lot

experiments are useful for analyzing the effects of multiple factors simultaneously. They involve presenting respondents with vignettes featuring different combinations of attributes that are systematically manipulated. This methodology enables the isolation and analysis of the effects of each factor, both individually and in combination, to understand their contributions to the outcome variable, as discussed by Auspurg and Hinz (2015b).

The experiment in this study focuses on five main factors, each with two levels. While these factors are not exhaustive, they aim to capture some of the most significant aspects of information disclosure and assess their varying impacts on citizens' perceptions of government trustworthiness. The factors and their respective levels are outlined in Table 1.

A full factorial design refers to an experimental setup where every possible combination of factors and levels is tested. In this case, with five factors each having two levels, a full factorial design would encompass $2^5 = 32$ scenarios. However, due to resource constraints, a fractional factorial design, specifically a 2^{5-1} design (which is a subset of the full factorial design), was employed instead. This design comprises 16 scenarios, representing a balanced and diverse selection

from the complete set of 32 scenarios. Although it limits the capacity to identify higher-order interactions, it remains effective for discerning main effects and first-level interactions (Auspurg & Hinz, 2015b).

To manage the balance between participant numbers and respondents' fatigue, each participant was assigned eight different vignettes from these 16 scenarios.

The fractional factorial design was created with the assistance of the FrF2 R package (Grömping, 2014), which generated a balanced subset of 16 combinations from the universe of all possible scenarios. These 16 combinations were then used to create 20 unique blocks or decks, each containing 8 combinations. This was achieved by dividing the 16 combinations into two sets of 8, and them randomly sampling 4 from each set for each block or deck. This ensures a diverse and orthogonal set of combinations within each vignette block (Auspurg & Hinz, 2015c).

The experiment was conducted with a sample of 103 US adults, selected from the Prime Panel group of the firm CloudResearch. This panel was chosen specifically because the firm controls it for fraudulent participants and bots. Additionally, an attention check was included in the questionnaire as a separate quality control measure. The survey instrument, developed using the Qualtrics platform, was designed to be accessible via computer, tablet, or smartphone. Qualtrics was a chosen because it can handle (Javascript) code execution within the survey. This code allowed to randomly and evenly assign participants to each of the vignette decks in an efficient manner. The questionnaire included questions related to demographics, political affiliations, and previous levels of trust in government, among others, which were use as control variables in the analysis. The survey instrument was distributed online between April 3rd and 11th, 2023.[2]

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[2]The experiment was first conducted on April 3rd, 2023. Upon analyzing the data, I

The sample in this experiment does not perfectly represent the demographic distribution of the US population, exhibiting an overrepresentation of the oldest age group and an underrepresentation of the highest income group, in comparison to the American Community Survey (2021)[3]. This characteristic of the sample poses a limitation in terms of generalizing the results to the entire US population. However, it does not compromise the study's primary goal, which is to investigate the mechanistic relationship between the act of information disclosure and the resulting level of trust.

Previous research has shown that citizens' trust in government is linked to different factors, such as gender, age, level of education and income, political preference, and occupation (Norris, 2001; Putnam, 2000). Therefore, such characteristics were measured and controlled for in the during the analysis.

Transparency is understood here as the availability of government information. The goal of the treatments is to make participants aware of different levels and configurations of transparency, focusing on the awareness of the act of disclosure rather than its content. To achieve this, participants evaluated eight vignettes, each describing an organization from a different hypothetical city. These vignettes began with a brief statement designed to guide the reader in inferring whether the organization exhibits an autonomous intention to disclose information or simply abides by the legal framework. This statement would either be: "The department *only discloses information that is* strictly required by the State Freedom of Information Act" or "The department *discloses more information than it is* strictly required by the State Freedom of Information

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discovered that the 'Attention Check' was not excluding respondents who failed to pass it automatically. As a result, I had to manually remove entries that would have otherwise been considered low quality and should not have been allowed to continue with the questionnaire. After completing this manual removal process, I found that there were not enough valid responses to advance to the analysis stage. Therefore, I had to initiate a second phase, this time with properly adjusted automatic attention checks.

[3]For an in-depth demographic comparison between the sample and the latest American Community Survey data, see Appendix B.1.
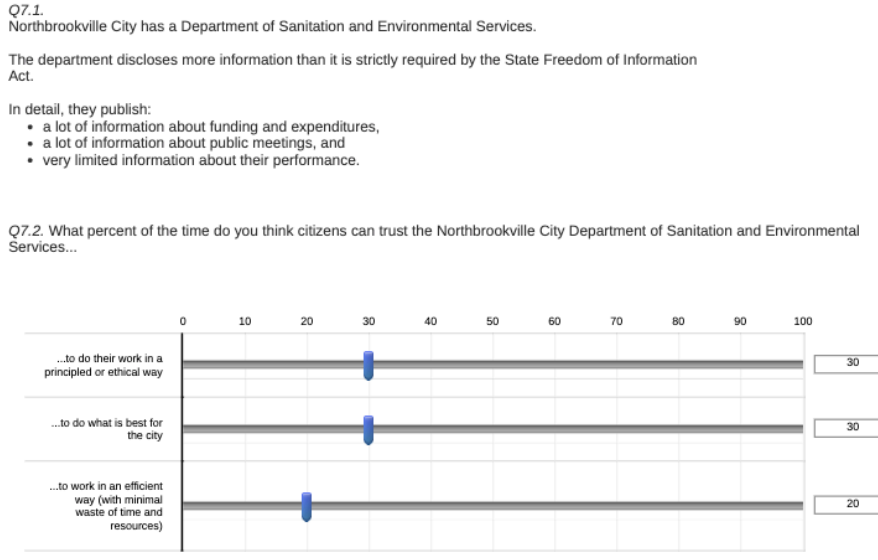
Figure 1: Vignette example.

Act". The characteristics of information disclosure then varied across dimensions such as the motive for disclosure, the type of information, and the specific government organization, allowing for a nuanced examination of transparency.

In organizational research, the three most important dimensions of trustworthiness are benevolence, competence and integrity (McEvily & Tortoriello, 2011). Consequently, the outcome variables measured for each vignette evaluation correspond to these three dimensions. The phrasing of the questions used to assess these outcome variables is loosely based on the American National Election Studies survey questions about trust (2021).The experiment survey asks "What percent of the time do you think citizens can trust the [name of the organization]...(1) to do their work in a principled or ethical way, (2) to do what is best for the city, (3) to work in an efficient way (with minimal wast of time and resources)"?.

In addition to these variables and the control variables mentioned before, a set of questions designed to measure baseline levels of confidence was included.

These questions asked about levels of confidence in the Executive Branch of the Federal Government, the US Supreme Court, the Congress and the Military, following the phrasing of the General Social Survey (2019). The responses where used to construct a unique index of confidence based on the medians.

To simplify the analysis, some categories of the control variables were collapsed. Specifically, the income variable, originally consisting of six categories ranging from 'Less than \$25,000' to '\$150,000 or more', was grouped into three categories: 'Less than \$50,000', '\$50,000-\$99,999', and '\$100,000 or more'. Education levels were condensed into four categories, combining the original eight levels such as 'Less than high school degree' to 'Doctorate degree'. Employment status was simplified into 'working', 'retired', and 'other', and a new variable, 'dummy_govt', was created to indicate whether the respondent works in government. These simplifications were carried out to manage low frequencies in some categories, and to make the analysis more manageable.

During the data preparation and analysis, missing data (NAs) were carefully handled. One case had five of the eight vignette evaluations missing so these five evaluations were dropped from the analysis. Another 3 respondents had missing income data, so their incomes were replaced with the median income.

Results and Analysis

I utilized a series of mixed-effects models to interpret the experiment's results. These models effectively address the data's hierarchical structure, arising from individual participants providing multiple evaluations (Auspurg & Hinz, 2015a). For constructing these models I employed the *statsmodels* module in Python (Seabold & Perktold, 2010).

Table 2: Effects of Disclosure Types on Trustworthiness Without Controls.

	perc_int	perc_ben	perc_eff
Intercept	41.6512***	44.2341***	41.5957***
	(2.4916)	(2.4274)	(2.5584)
org[T.Police Department]	-0.2175	-0.4711	0.0755
	(1.2881)	(1.2989)	(1.3315)
motiv[T.only discloses information that is]	-3.6810***	-4.4974***	-1.8064
	(1.2626)	(1.2737)	(1.3053)
tran_fin[T.a lot of]	9.9164***	8.1305***	10.1365***
	(1.2704)	(1.2814)	(1.3132)
tran_pm[T.a lot of]	7.3777***	9.1955***	5.1621***
	(1.2704)	(1.2812)	(1.3131)
tran_perf[T.a lot of]	13.3499***	10.7763***	10.7829***
	(1.2856)	(1.2967)	(1.3290)
Group Var	1.3076***	1.1563***	1.2775***
	(0.2150)	(0.1922)	(0.2109)

Standard errors in parentheses.
* $p < .1$, ** $p < .05$, ***$p < .01$

Effects of Disclosure on Government Trustworthiness Perceptions

Table 2 presents the mixed model results, excluding controls for integrity, benevolence, and efficiency perceptions. Notably, only the *confidence median index* and *working status* were significant among all control variables in two models. Introducing controls into the model reduced the significance of the grouping variable (respondent_id), suggesting that the random effects component of the model might already capture some of the variance attributed to these controls. Overall, the estimated coefficients for the manipulated variables remained unchanged when controls were applied, as outlined in the Appendix C (the detailed models are available in the same appendix).

The coefficients for transparency types—financial, public meetings, and performance—were all positive and statistically significant at the 0.05 level. This indicates that disclosing information in these areas has a perceptible effect on enhancing citizens' perceptions of government trustworthiness. Specifically, the coefficients represent the difference in perceptions between organizations that disclose 'a lot

Comparison of Percentage Change Across Dependent Variables
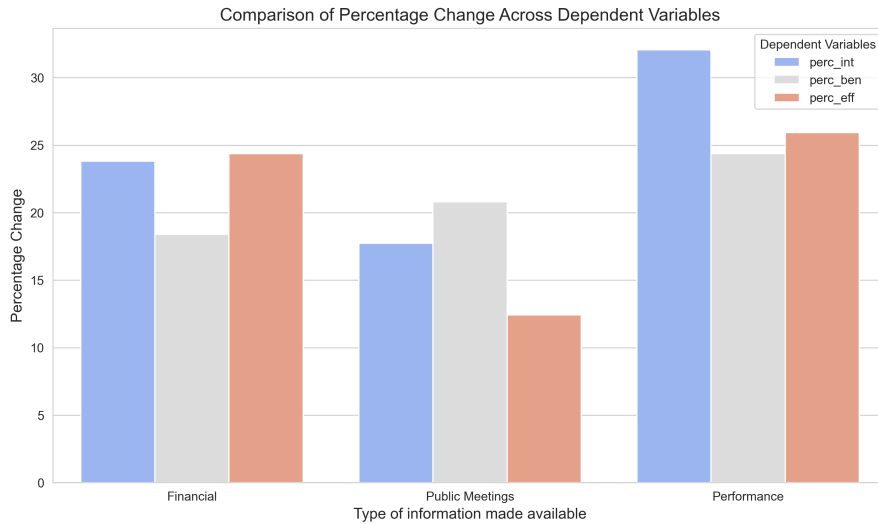
Figure 2: Proportional increase in perceptions of trustworthiness when an organization provides 'a lot of' information on finances, public meetings, and performance, compared to when it provides 'very limited' information.

of' information on these matters and those that reveal 'very limited' information.

These results provide strong support for H1a, which posits that "Learning about government information disclosure leads to a positive change in citizens' perceptions of government trustworthiness". As a consequence, we can dismiss the alternate hypothesis H1b, which suggests a negative or null effect. The analysis further reveals that among the three types of transparency, performance transparency has the most important impact on trustworthiness perceptions. These insights underscore the relevancy of learning about act of performance transparency in shaping citizens' views of government trustworthiness.

Concretely, the coefficients for high level of disclosure of performance information represent an increase of 35.1% (integrity), 27.1% (benevolence), and 27.1% (efficiency) from the baseline perceptions (intercept values of 37.970, 39.737, and 39.789, respectively) (see Figure 2). In contrast, financial transparency shows increases of 26.1%, 20.5%, and 25.5%, and public meetings trans-

parency increases of 19.4%, 23.1%, and 13.0%.

Influence of Disclosure Motivation on Trustworthiness Perceptions

The implied motivation behind disclosure—whether an organization shares more information than the Freedom of Information Act (FOIA) mandates, or merely meets its requirements—significantly affects two trustworthiness dimensions: benevolence and integrity. Voluntarily exceeding FOIA stipulations results in a 3.7 point (9.7%) boost in integrity perceptions and a 4.5 point (11.31%) surge in benevolence perceptions (see Table 2).

These results provide support for hypothesis H2, which states that "Organizations that disclose more information than required are perceived as more trustworthy". Although this effect is limited to perceptions of integrity and benevolence.

Influence of Organization Type on Transparency's Effect on Trustworthiness Perceptions

To assess hypothesis H3, I constructed a model that considers the interaction between organization type, levels of information disclosure, and the implied motivation to disclose. Table 3 reveals that the interactions are insignificant for all three dimensions of perception of trustworthiness. These results indicate no grounds to reject the null hypothesis H3. For a comprehensive view of each model, please refer to the Appendix Section C.

Interaction Effects Between Disclosure of Different Types of Information

To examine if there are interaction effects between different types of information, I constructed another set of Mixed Linear Models including interactions between

Table 3: Interaction Between Organization Type and Information Disclosure.

	perc_int	perc_ben	perc_eff
Intercept	40.1217***	41.7482***	39.6528***
	(2.9261)	(2.8803)	(3.0131)
org[T.Police Department]	2.2598	3.7491	3.3365
	(2.9234)	(2.9523)	(3.0291)
motiv[T.only discloses information that is]	-2.6070	-2.7937	-0.7594
	(1.8433)	(1.8615)	(1.9103)
tran_fin[T.a lot of]	12.0083***	9.8877***	11.4780***
	(1.8259)	(1.8441)	(1.8917)
tran_pm[T.a lot of]	8.6492***	10.5008***	6.4259***
	(1.8114)	(1.8294)	(1.8767)
tran_perf[T.a lot of]	11.9318***	10.9318***	11.0255***
	(1.8163)	(1.8344)	(1.8818)
org[T.Police Department]:tran_fin[T.a lot of]	-3.6409	-3.1492	-2.3647
	(2.5693)	(2.5946)	(2.6618)
org[T.Police Department]:tran_pm[T.a lot of]	-2.3823	-2.0412	-2.1270
	(2.5606)	(2.5860)	(2.6531)
org[T.Police Department]:tran_perf[T.a lot of]	2.8265	-0.3371	-0.4299
	(2.5449)	(2.5704)	(2.6369)
org[T.Police Department]:motiv[T.only discloses information that is]	-1.6881	-3.0441	-1.7760
	(2.5954)	(2.6206)	(2.6896)
Group Var	1.3050***	1.1495***	1.2667***
	(0.2148)	(0.1913)	(0.2094)

Standard errors in parentheses.

* $p < .1$, ** $p < .05$, ***$p < .01$

the levels of disclosure of the three types of information (finance, public meetings and performance). Table 4 shows the summary results for each of the models. The detailed results of each model are shown in the Appendix C.

These models try to capture how different levels of disclosure might influence one another. From all three dimensions of perception of trustworthiness, the only interaction that is statistically significant involves the pairing of disclosing "a lot of" financial information and "a lot of" performance information. This interaction suggests that the effect on perceptions of effectiveness from disclosure of financial information is contingent on the level of disclosure of performance information. When transparency of performance is "a lot of", the effect of disclosing "a lot of" financial information is 6.6 points higher, a %16 increase in perceived effectiveness with the rest of the variables at their reference levels.

To make sure that these results are not confounded by multicollinearity among the predictors, I conducted a Variance Inflation Factor (VIF) analysis. The VIF values for all variables, including interaction terms, were found to be below 5, with the highest being 2.9547 for the interaction between transparency of finance and transparency of public meetings. These low VIF values indicate that the predictors in the model are not highly correlated with each other, supporting the validity of the interpretation of individual coefficients and interaction effects. The full VIF results are provided in Table + 19 in the Appendix Section D.1.

In sum, these results partially support hypothesis H4, which states that "the effect of transparency on perceived trustworthiness is influenced by the interaction between different types of transparency (financial, public meetings, performance), where the impact of one type depends on the level of another".

Table 4: Interaction Effects Between Types of Information Disclosure.

	perc_int	perc_ben	perc_eff
Intercept	41.6776***	44.7746***	43.7586***
	(2.7692)	(2.7163)	(2.8309)
org[T.Police Department]	-0.2563	-0.7210	0.0835
	(1.3032)	(1.3118)	(1.3414)
motiv[T.only discloses information that is]	-3.6401***	-4.4593***	-2.0024
	(1.2674)	(1.2762)	(1.3046)
tran_fin[T.a lot of]	10.4405***	8.5196***	5.6561**
	(2.1484)	(2.1630)	(2.2115)
tran_pm[T.a lot of]	7.0455***	7.2540***	4.0288*
	(2.1483)	(2.1628)	(2.2111)
tran_perf[T.a lot of]	13.0383***	10.4759***	8.2783***
	(2.1397)	(2.1541)	(2.2028)
tran_fin[T.a lot of]:tran_pm[T.a lot of]	-0.5160	1.4669	3.2040
	(2.5436)	(2.5611)	(2.6182)
tran_fin[T.a lot of]:tran_perf[T.a lot of]	-0.7140	-2.7674	6.6463**
	(2.5881)	(2.6062)	(2.6649)
tran_pm[T.a lot of]:tran_perf[T.a lot of]	1.3513	3.0667	-1.3959
	(2.5519)	(2.5697)	(2.6268)
Group Var	1.3047***	1.1640***	1.2668***
	(0.2147)	(0.1935)	(0.2095)

Standard errors in parentheses.

* $p < .1$, ** $p < .05$, ***$p < .01$

(a) Perc. of Int.**   (b) Perc. of Ben.***   (c) Perc. of Eff. (n.s.)
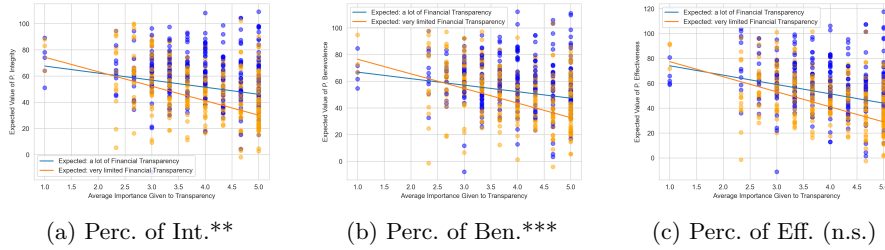
Figure 3: Relationship between the average importance given to transparency (avg_imp_tran) and the expected values of perceived integrity, benevolence, and effectiveness for two levels of financial transparency (a lot and very limited). The lines represent the expected values from the mixed linear models, while the scatter points illustrate the observed values adjusted for group (respondent) variation.
* $p < .1$, ** $p < .05$, *** $p < .01$

Effect of the Importance Given to Transparency on the Influence of Information Disclosure on Perceptions of Trustworthiness.

To analyze the interaction effect of the importance given to transparency, I produced another Mixed Linear Model with interactions between textitaverage importance given to transparency and the manipulated variables related to information disclosure.

Table 5 shows the summary results of the models for each outcome variable. For brevity, the detailed results of each model are shown in the Appendix C. Overall, the results indicate that the importance given to transparency moderates the effect of financial information disclosure and partially moderates the influence of the other two types of transaprency on perceptions of trustworthiness.

Introducing these interactions complicates the interpretation of the coefficients. At the reference levels of the variables ("very limited" for transparencies and the minimum category for Avg. Importance of Transparency), the coefficients of Avg. Importance of Transparency decrease the effect on the outome variables by 10.9 to 12.1 points. This pattern of influence is compatible with

Table 5: Moderating Effect of Transparency Importance on Disclosure Impact.

	perc_int	perc_ben	perc_eff
Intercept	85.4352***	87.4552***	89.5406***
	(10.5764)	(10.2242)	(10.7743)
org[T.Police Department]	-0.2989	-0.4353	0.1989
	(1.2746)	(1.2866)	(1.3224)
motiv[T.only discloses information that is]	-3.6785***	-4.5475***	-1.8866
	(1.2474)	(1.2595)	(1.2944)
tran_fin[T.a lot of]	-12.4125**	-15.7265***	-7.9016
	(5.9365)	(5.9934)	(6.1599)
tran_pm[T.a lot of]	-5.6455	3.0519	-2.2865
	(5.9630)	(6.0190)	(6.1868)
tran_perf[T.a lot of]	7.6473	-1.6232	-5.4847
	(6.0033)	(6.0597)	(6.2285)
avg_imp_tran	-11.0662***	-10.9380***	-12.1279***
	(2.6023)	(2.5143)	(2.6504)
avg_imp_tran:tran_fin[T.a lot of]	5.6757***	6.0641***	4.5964***
	(1.4704)	(1.4845)	(1.5257)
avg_imp_tran:tran_pm[T.a lot of]	3.2956**	1.5666	1.8939
	(1.4718)	(1.4857)	(1.5271)
avg_imp_tran:tran_perf[T.a lot of]	1.4814	3.1661**	4.1309***
	(1.4837)	(1.4977)	(1.5394)
Group Var	1.2482***	1.0933***	1.1810***
	(0.2073)	(0.1838)	(0.1976)

Standard errors in parentheses.

* $p < .1$, ** $p < .05$, ***$p < .01$

the interpretation that when individuals do not regard transparency as important, increased transparency is not only inconducive to trust, it can lead to decreased trust. As the importance attributed to transparency increases, the effect of disclosing abundant financial information intensifies: each additional level in Avg. Importance Given to Transparency, when paired with extensive financial disclosure, corresponds to an average rise of 4.6 to 6.1 points for the dependent variables. The interaction with the other two types of transparency is more complex (see Table 5).

The findings lend support to hypothesis H5, positing that "the importance given to transparency moderates the effect of information disclosure on trust".

4 Discussion

Before delving into the core findings of this study, it is essential to acknowledge its limitations. Firstly, while the factorial survey experiment is a robust instrument, its design, which involved presenting respondents with vignettes about hypothetical cities, might not capture real-world reactions to government transparency. This design also introduces the potential for demand characteristics, where participants might discern the study's purpose and adjust their responses to align with what they perceive as the desired outcome. Such biases could influence the authenticity of participants' reactions to the vignettes.

Additionally, the study's sample was not fully representative of the broader US population. Notable differences in the sample, such as the overrepresentation of the oldest age group and the underrepresentation of the highest income group, limit the external validity of the findings.

Furthermore, the study's emphasis on the act of disclosure, rather than its content, has its own set of implications. The focus on the act of transparency can be pivotal in understanding how those who never access government infor-

Hypothesis	Description	Result
H1a	*Learning about government information disclosure leads to a positive change in citizens' perceptions of government trustworthiness.*	Supported
H1b	*Learning about government transparency either does not affect or negatively affects citizens' perceptions of government trustworthiness.*	Rejected
H2	*Organizations that disclose more information than legally required are perceived as more trustworthy.*	Supported
H3	*The effect of learning about government transparency on perceptions of government trustworthiness varies depending on the nature of the organization, such as between the Police Department and the Department of Sanitation and Environmental Services.*	Not Supported
H4	*The effect of transparency on perceived trustworthiness is influenced by the interaction between different types of transparency (financial, public meetings, performance), where the impact of one type depends on the level of another.*	Partially Supported
H5	*The importance placed on transparency by individuals positively moderates the relationship between an organization's level of transparency and perceptions of government trustworthiness.*	Supported

Table 6: Summary of Hypotheses and Results

mation are still influenced by transparency policies. However, this represents just one facet of transparency. For individuals who actively access government information, the content of the specific information they encounter might play a more significant role in shaping their trust.

Lastly, it's worth noting that the study faced logistical challenges. Specifically, the 'attention check' malfunctioned during the initial phase, requiring a second round of data collection a week later, a deviation from the ideal experimental setup, but a necessary step to maintain data integrity. With these limitations in mind, we can now delve into the study's findings and their implications.

The relationship of government transparency and its effects on trust is complex. The results presented in this study add nuance to our understanding of the relationship between the act of government information disclosure and its impact on citizens' perceptions of trustworthiness, independent from the particular information disclosed. Several findings emerge from this analysis of the experiment that help to better understand mechanisms of influence of transparency.

One of the main findings of this study was the significant positive effect of financial, public meetings, and performance transparency on perceptions of government trustworthiness. This signifies that citizens find governments more trustworthy when they are upfront about their financial dealings, meetings, and performance metrics. Notably, of the three, performance transparency had the most substantial impact. This underscores the importance of performance metrics in shaping the narrative around government efficiency and efficacy.

The results of this study also encourage a reconsideration of previous evidence from the only existing research on the act of disclosure, which identified neutral to negative effects associated with the transparency efforts of the FOIA

and the data.gov initiative(Grimmelikhuijsen et al., 2020). Under the light of these new findings, if citizens reacted neutrally or negatively to learning about FOIA and data.gov, it might be, perhaps, due to the specific contents of these two policies, the way they were presented to them or their association with the Federal Government.

The influence of an organization's motivation behind information disclosure is another interesting finding. Disclosing information beyond mandatory requirements amplifies positive perceptions of trustworthiness. This suggests that citizens might interpret proactive disclosure beyond legal requirements as a signal that the people running the organization is more trustworthy.

While there were expectations that the type of organization would influence the relationship between transparency and trustworthiness (H3), the findings did not provide support for this hypothesis. At least for the two organizations tested in this experiment—the Police Department and the Department of Sanitation—it appears that the nature of the organization doesn't significantly alter perceptions of trustworthiness when transparency is present. This raises questions about the universal impact of transparency across various governmental sectors, which could be explored in future research.

The interaction effects explored in the study further enrich our understanding of the transparency-trustworthiness link. For the most part, the influence of three types of information disclosure analysed in this experiment, financial, public meetings, and performance, does not seem to be dependent on one another. There is one exception: the observed interaction between financial and performance transparency. The significant effect of the interaction between these two variables suggests that there is a synergistic effect when both types of transparency are at a high level. In other words, the three types of information disclosure might be impactful, but when financial and performance information

are combined, they could amplify their positive influence.

Finally, the moderation effect of the importance citizens place on transparency is of particular significance. The finding that increased transparency can lead to decreased trust among those who do not regard transparency as important is an essential insight. It suggests that the value and expectations citizens place on transparency can mediate its overall impact. While some might see it as a drain on public resources others might see it as indispensable for promoting democratic engagement and oversight.

Conclusion

This study explored the influence of government information disclosure on citizens' trust, with a focus on the act of disclosure irrespective of the content. It found that the act of disclosing information regarding finances, public meetings, and performance significantly enhances citizens' perception of government trustworthiness. Among these, performance transparency had the most pronounced effect on trustworthiness perceptions.

Furthermore, a synergistic effect was observed when both financial and performance information disclosure were described as being high, suggesting that the combination of these transparency types could have a greater positive effect on trust. This suggests a potential area for further investigation into how different types of transparency interact to influence trust.

The analysis also revealed that the motivation behind disclosure plays a role in trustworthiness perceptions. Specifically, organizations that disclosed more information than required by the Freedom of Information Act (FOIA) were perceived as more trustworthy, highlighting the importance of voluntary disclosure in enhancing trust.

The study also found that the importance citizens place on transparency

moderates the effect of disclosure on trust. When transparency was deemed less important, the positive effect of disclosure on trust was diminished, indicating that individual valuation of transparency is a significant factor in how disclosure influences trust.

However, the type of organization involved in the disclosure did not significantly alter perceptions of trustworthiness, refuting the hypothesis that organizational type might act as a moderating factor in the transparency-trust relationship.

The study faced certain limitations, including a non-representative sample and the use of hypothetical scenarios, which might affect the generalizability of the findings. These limitations suggest avenues for future research to validate the findings in more diverse and real-world settings.

In summary, the study provides evidence that the act of information disclosure by government organizations positively influences citizens' trust, and that this effect is moderated by individual differences in transparency valuation and the motivation behind disclosure. The findings suggest that ensuring citizens are aware of disclosure acts, and encouraging voluntary disclosure beyond legal requirements, could be effective strategies for governments to enhance public trust.

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Appendix A   Questionnaire Example

Q1.1.

INFORMED CONSENT

I confirm that I have received the information provided in this file and declare having read and understood its content. I confirm that I am 18 years of age or older, and volunteer to take part in this research. (Consent for minors or incapacitated individuals should be obtained from their legal tutors). Taking note that my data are processed in full compliance with the Law, I freely consent to my data to be used in the manner and uses described. I also declare having understood my rights and limitations, as well as how to exercise them.

◉ I consent, begin the study.

○ I do not consent, I do not wish to participate.

Q2.1. First we would like to ask you a few questions about yourself.

Q2.2. How do you describe yourself?

◉ Male

○ Female

○ Non-binary / third gender

○ Prefer to self-describe [_____]

○ Prefer not to say

Q2.3. How old are you?

○ Under 18

○ 18-24 years old

○ 25-34 years old

○ 35-44 years old

○ 45-54 years old

○ 55-64 years old

◉ 65+ years old

Q2.4. Are you of Spanish, Hispanic, or Latino origin?

○ Yes

◉ No

Q2.5. Choose one or more races that you consider yourself to be

☑ White or Caucasian

☐ Black or African American

☐ American Indian/Native American or Alaska Native

☐ Asian

☐ Native Hawaiian or Other Pacific Islander

☐ Other

☐ Prefer not to say

Q2.6. What is the highest level of school you have completed or the highest degree you have received?

○ Less than high school degree

○ High school graduate (high school diploma or equivalent including GED)

○ Some college but no degree

○ Associate degree in college (2-year)

◉ Bachelor's degree in college (4-year)

○ Master's degree (for example: MA, MS, MEng, MEd, MSW, MBA)

○ Professional degree beyond a bachelor's degree (for example: MD, DDS, DVM, LLB, JD)

○ Doctorate degree (for example: PhD, EdD)

Q2.7. What best describes your employment status over the last three months?

○ Working full-time

○ Working part-time

○ Unemployed and looking for work

○ A homemaker or stay-at-home parent

○ Student

◉ Retired

○ Other

Q2.8. Where are you employed?

This question was not displayed to the respondent.

Q2.9. What was your total household income before taxes during the past 12 months?

○ Less than $25,000

○ $25,000-$49,999

◉ $50,000-$74,999

○ $75,000-$99,999

○ $100,000-$149,999

○ $150,000 or more

○ Prefer not to say

Q2.10. What is your US Zip Code?

43017

Q3.1.
Were you born in the United States of America?

○ Yes
○ No

Q3.2. Are you a citizen of the United States of America?

○ Yes
○ No

Q3.3. Did you vote in the last election?

○ Yes
○ No

Q3.4.
Generally speaking, do you usually think of yourself as a Republican, a Democrat, an Independent, or something else?

◉ Republican
○ Democrat
○ Independent
○ Other [   ]
○ No preference

Q3.5. Would you call yourself a strong Republican or a not very strong Republican?

◉ Strong
○ Not very strong

Q3.6.
Would you call yourself a strong Democrat or a not very strong Democrat?

This question was not displayed to the respondent.

Q3.7.
Do you think of yourself as closer to the Republican or Democratic party?

This question was not displayed to the respondent.

Q3.8. Here is a 7-point scale on which the political views that people might hold are arranged from extremely liberal to extremely conservative. Where would you place yourself on this scale?

○ Extremely liberal
○ Somewhat liberal
○ Neither conservative nor liberal
◉ Somewhat conservative
○ Extremely conservative

Q3.9. Please select the boxes that correspond to US political parties.

- ☑ Republican
- ☑ Democratic
- ☐ No preference

Q4.1. Now, we would like to ask about your thoughts on the government. Please take your time and answer honestly.

Q4.2. Below is a list of some institutions in this country. As far as the people running these institutions are concerned, how much confidence would you say you have in them?

Executive branch of the federal government	None at all ⌄
U.S. Supreme Court	A moderate amount ⌄
Congress	A little ⌄
Military	A moderate amount ⌄

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Q5.1.
Government organizations often share a variety of information with the public, but doing so comes with significant costs and risks. We are interested in understanding your thoughts on making different kinds of information public.

In general, how important do you think it is for a government organization to publicly share...

Q5.2. ... information about funding and expenditures (such as salaries, purchases of equipment and supplies)?

- ◯ Not at all important
- ◯ Slightly important
- ◯ Moderately important
- ⦿ Very important
- ◯ Extremely important

Q5.3. ...recordings and transcripts of public meetings?

- ◯ Not at all important
- ⦿ Slightly important
- ◯ Moderately important
- ◯ Very important
- ◯ Extremely important

Q5.4. ...information about the organization's performance?

○ Not at all important

○ Slightly important

○ Moderately important

◉ Very important

○ Extremely important

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Q6.1.
In the following section, you'll learn about eight public organizations in hypothetical U.S. cities.

Please carefully consider each one and provide honest answers to the questions that follow.

Q7.1.
Northbrookville City has a Department of Sanitation and Environmental Services.

The department discloses more information than it is strictly required by the State Freedom of Information Act.

In detail, they publish:
- a lot of information about funding and expenditures,
- a lot of information about public meetings, and
- very limited information about their performance.

Q7.2. What percent of the time do you think citizens can trust the Northbrookville City Department of Sanitation and Environmental Services...

...to do their work in a principled or ethical way	30
...to do what is best for the city	30
...to work in an efficient way (with minimal waste of time and resources)	20
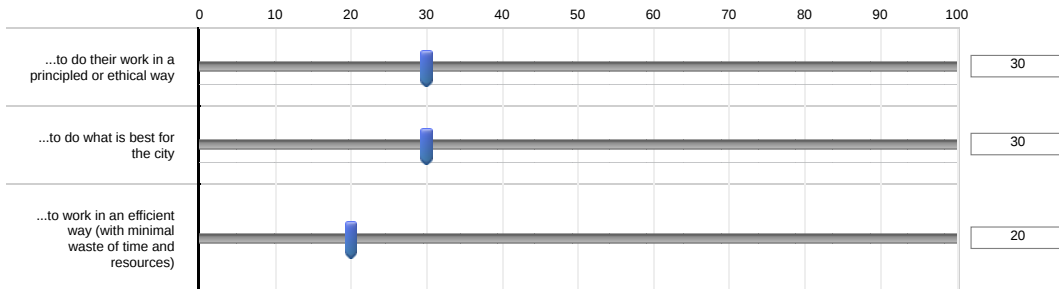
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Q7.1.
Redmond Valley has a Police Department.

The department discloses more information than it is strictly required by the State Freedom of Information Act.

In detail, they publish:
- very limited information about funding and expenditures,
- very limited information about public meetings, and
- a lot of information about their performance.

Q7.2. What percent of the time do you think citizens can trust the Redmond Valley Police Department...

	0	10	20	30	40	50	60	70	80	90	100	
...to do their work in a principled or ethical way												51
...to do what is best for the city												52
...to work in an efficient way (with minimal waste of time and resources)												22

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Q7.1.
Oakmont Ridge has a Police Department.

The department discloses more information than it is strictly required by the State Freedom of Information Act.

In detail, they publish:
- very limited information about funding and expenditures,
- very limited information about public meetings, and
- a lot of information about their performance.

Q7.2. What percent of the time do you think citizens can trust the Oakmont Ridge Police Department...

	0	10	20	30	40	50	60	70	80	90	100	
...to do their work in a principled or ethical way												58
...to do what is best for the city												73
...to work in an efficient way (with minimal waste of time and resources)												62

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Q7.1.
Hillcrest Park has a Department of Sanitation and Environmental Services.

The department discloses more information than it is strictly required by the State Freedom of Information Act.

In detail, they publish:

- very limited information about funding and expenditures,
- a lot of information about public meetings, and
- a lot of information about their performance.

Q7.2. What percent of the time do you think citizens can trust the Hillcrest Park Department of Sanitation and Environmental Services...

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Q7.1.
Maplewood Ridge has a Department of Sanitation and Environmental Services.

The department only discloses information that is strictly required by the State Freedom of Information Act.

In detail, they publish:
- a lot of information about funding and expenditures,
- very limited information about public meetings, and
- very limited information about their performance.

Q7.2. What percent of the time do you think citizens can trust the Maplewood Ridge Department of Sanitation and Environmental Services...
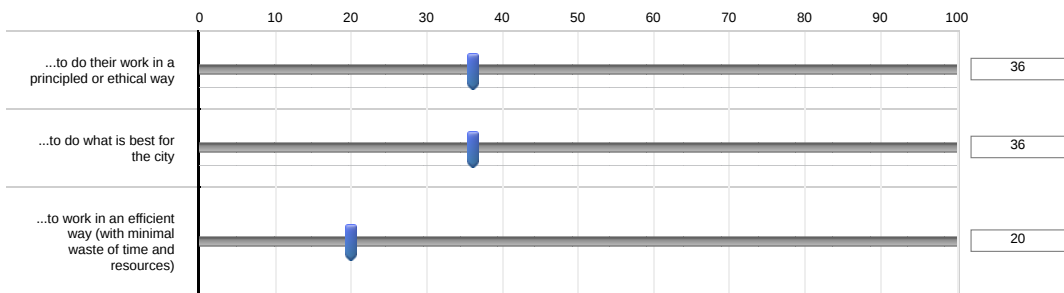
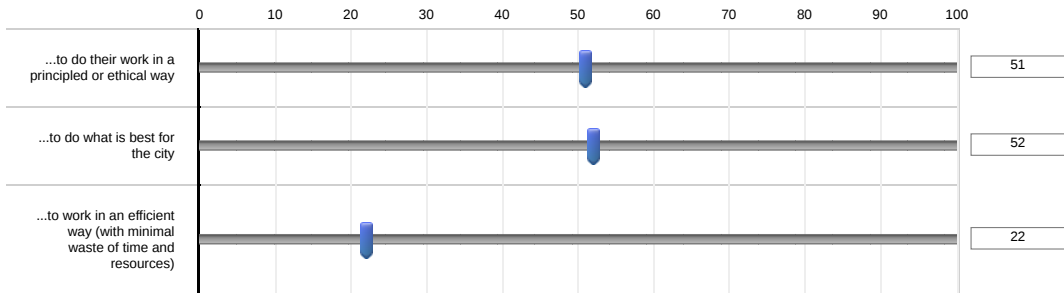**First Click:** 16.721
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Q7.1.

Windhamville has a Department of Sanitation and Environmental Services.

The department only discloses information that is strictly required by the State Freedom of Information Act.

In detail, they publish:
- very limited information about funding and expenditures,
- a lot of information about public meetings, and
- very limited information about their performance.

Q7.2. What percent of the time do you think citizens can trust the Windhamville Department of Sanitation and Environmental Services...
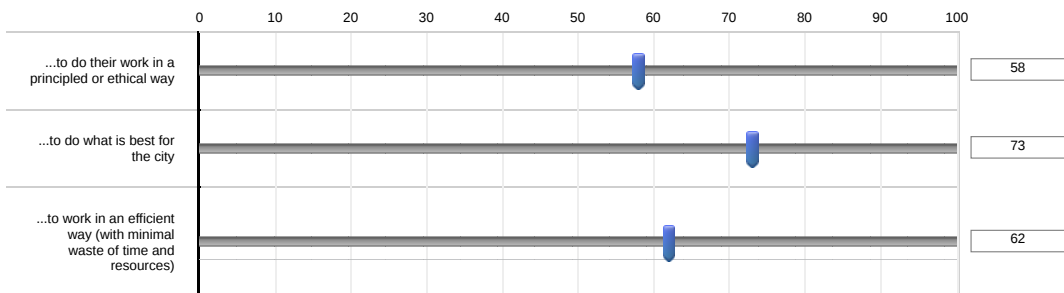
	0	10	20	30	40	50	60	70	80	90	100	
...to do their work in a principled or ethical way												24
...to do what is best for the city												29
...to work in an efficient way (with minimal waste of time and resources)												20
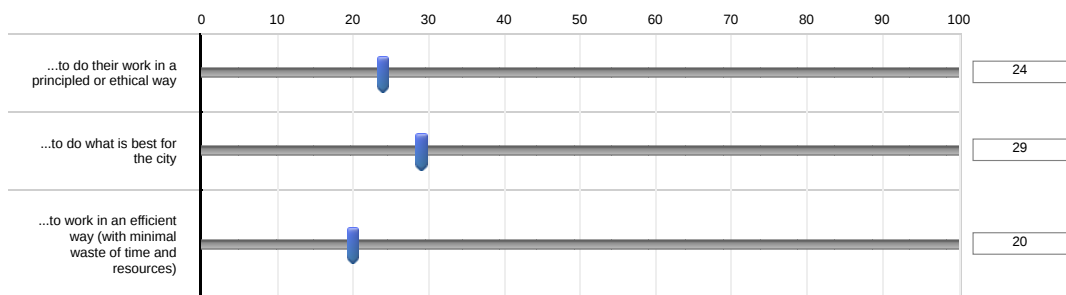
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Q7.1.
Cedarbrook Springs has a Department of Sanitation and Environmental Services.

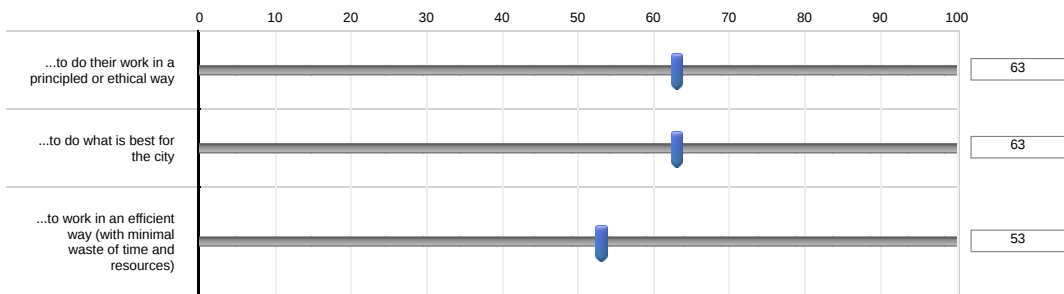The department only discloses information that is strictly required by the State Freedom of Information Act.

In detail, they publish:
- very limited information about funding and expenditures,
- very limited information about public meetings, and
- a lot of information about their performance.

Q7.2. What percent of the time do you think citizens can trust the Cedarbrook Springs Department of Sanitation and Environmental Services...

	0	10	20	30	40	50	60	70	80	90	100	
...to do their work in a principled or ethical way												30
...to do what is best for the city												37
...to work in an efficient way (with minimal waste of time and resources)												20
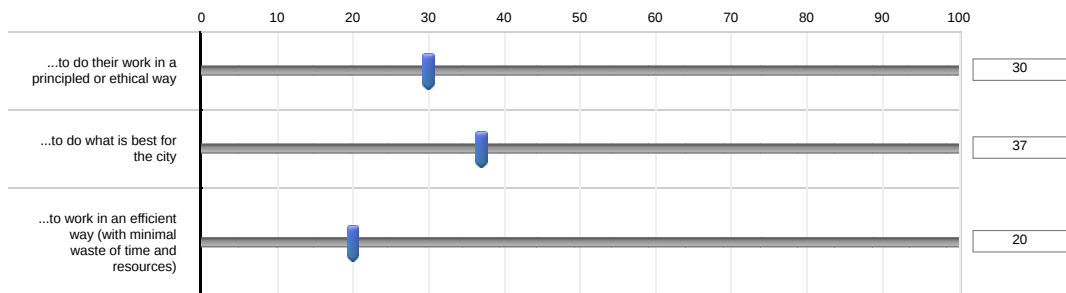
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Q7.1.
Lakeville Heights has a Police Department.

The department only discloses information that is strictly required by the State Freedom of Information Act.

In detail, they publish:
- a lot of information about funding and expenditures,
- very limited information about public meetings, and
- a lot of information about their performance.

Q7.2. What percent of the time do you think citizens can trust the Lakeville Heights Police Department...

	0	10	20	30	40	50	60	70	80	90	100	
...to do their work in a principled or ethical way												55
...to do what is best for the city												54
...to work in an efficient way (with minimal waste of time and resources)												20
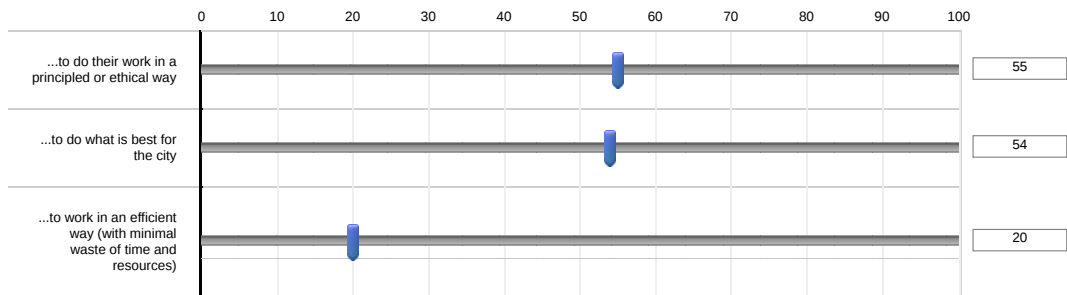
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Var1_1: Department of Sanitation and Environmental Services

Var2_1: a lot of

Var3_1: a lot of

Var4_1: very limited

Var5_1: discloses more information than it is

Var1_2: Police Department

Var2_2: very limited

Var3_2: very limited

Var4_2: a lot of

Var5_2: discloses more information than it is

Var1_3: Police Department

Var2_3: very limited

Var3_3: very limited

Var4_3: a lot of

Var5_3: discloses more information than it is

Var1_4: Department of Sanitation and Environmental Services

Var2_4: very limited

Var3_4: a lot of

Var4_4: a lot of

Var5_4: discloses more information than it is

Var1_5: Department of Sanitation and Environmental Services

Var2_5: a lot of

Var3_5: very limited

Var4_5: very limited

Var5_5: only discloses information that is

Var1_6: Department of Sanitation and Environmental Services

Var2_6: very limited

Var3_6: a lot of

Var4_6: very limited

Var5_6: only discloses information that is

Var1_7: Department of Sanitation and Environmental Services

Var2_7: very limited

Var3_7: very limited

Var4_7: a lot of

Var5_7: only discloses information that is

Var1_8: Police Department

Var2_8: a lot of

Var3_8: very limited

Var4_8: a lot of

Var5_8: only discloses information that is

Appendix B   Sample

B.1   Demographic Distributions

B.1.1   Gender Distribution

Gender	ACS Data	Experiment Sample
Male	161,952,654 (48.8%)	49 (47.57%)
Female	169,954,983 (51.2%)	54 (52.43%)

B.1.2   Age Group Distribution

Age Group	ACS Data	Experiment Sample
18–24 years old	30,208,434 (9.1%)	14 (13.59%)
25–34 years old	44,270,418 (13.3%)	13 (12.62%)
35–44 years old	41,365,542 (12.5%)	9 (8.74%)
45–54 years old	40,587,276 (12.2%)	10 (9.71%)
55–64 years old	42,276,244 (12.7%)	15 (14.56%)
65+ years old	72,974,075 (22%)	42 (40.78%)

B.1.3   Hispanic Origin Distribution

Hispanic Origin	ACS Data	Experiment Sample
Yes	62,529,064 (18.8%)	11 (10.68%)
No	269,378,573 (81.2%)	92 (89.32%)

B.1.4   Education Distribution

Education Level	ACS Data	Experiment Sample
Bachelor's degree or higher	72,608,097 (35%)	38 (36.89%)
Less than Bachelor's degree	134,862,870 (65%)	65 (63.11%)

B.1.5   Income Group Distribution

Income Group	ACS Data	Experiment Sample
Less than $25,000	22,176,331 (17.39%)	12 (12.5%)
$25,000-$49,999	24,334,164 (19.08%)	30 (31.25%)
$50,000-$74,999	21,443,341 (16.81%)	26 (27.08%)
$75,000-$99,999	16,276,811 (12.76%)	10 (10.42%)
$100,000-$149,999	20,741,047 (16.26%)	13 (13.54%)
$150,000 or more	22,573,036 (17.70%)	9 (9.38%)

B.1.6   Race Distribution

Race	ACS Data	Experiment Sample
White or Caucasian	241.8M (72.9%)	88 (85.44%)
Black or African American	47.2M (14.2%)	11 (10.68%)
American Indian / Native Ame.		
or Alaska Native	8.7M (2.6%)	2 (1.94%)
Asian	23.6M (7.1%)	1 (0.97%)
Native Hawaiian and		
Other Pacific Islander	1.5M (0.5%)	0 (0%)
Other	-	1 (0.97%)
Total	322.8M (100%)	103 (100%)

Appendix C   Additional Models

Models to Test H1

Tables 7, 8, and 9 show the results of each model for all three dependent variables respectively: perception of integrity, benevolence, and effectiveness.[4] Ta-

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[4]The "Min. group size: 3" shown on the tables is caused by the only case with 5 missing evaluations, mentioned in Section 3. All the rest of the respondents evaluated 8 vignettes.

bles 10, 11, and 12 show the same models with controls for all three dependent variables respectively.

Table 7: Perception of Integrity - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_int
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	287.2841
Min. group size:	3	Log-Likelihood:	-3594.8592
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	41.651	2.492	16.717	0.000	36.768	46.535
org[T.Police Department]	-0.217	1.288	-0.169	0.866	-2.742	2.307
motiv[T.only discloses information that is]	-3.681	1.263	-2.915	0.004	-6.156	-1.206
tran_fin[T.a lot of]	9.916	1.270	7.806	0.000	7.427	12.406
tran_pm[T.a lot of]	7.378	1.270	5.808	0.000	4.888	9.868
tran_perf[T.a lot of]	13.350	1.286	10.384	0.000	10.830	15.870
Group Var	375.649	3.645				

Table 8: Perception of Benevolence - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_ben
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	292.7182
Min. group size:	3	Log-Likelihood:	-3596.7946
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	44.234	2.427	18.223	0.000	39.476	48.992
org[T.Police Department]	-0.471	1.299	-0.363	0.717	-3.017	2.075
motiv[T.only discloses information that is]	-4.497	1.274	-3.531	0.000	-6.994	-2.001
tran_fin[T.a lot of]	8.131	1.281	6.345	0.000	5.619	10.642
tran_pm[T.a lot of]	9.196	1.281	7.177	0.000	6.684	11.707
tran_perf[T.a lot of]	10.776	1.297	8.311	0.000	8.235	13.318
Group Var	338.463	3.289				

Table 9: Perception of Efficiency - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_eff
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	307.0818
Min. group size:	3	Log-Likelihood:	-3620.8673
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	41.596	2.558	16.258	0.000	36.581	46.610
org[T.Police Department]	0.076	1.331	0.057	0.955	-2.534	2.685
motiv[T.only discloses information that is]	-1.806	1.305	-1.384	0.166	-4.365	0.752
tran_fin[T.a lot of]	10.137	1.313	7.719	0.000	7.563	12.710
tran_pm[T.a lot of]	5.162	1.313	3.931	0.000	2.589	7.736
tran_perf[T.a lot of]	10.783	1.329	8.114	0.000	8.178	13.388
Group Var	392.284	3.695				

Table 10: Perc. of Int. with Controls - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_int
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	287.2835
Min. group size:	3	Log-Likelihood:	-3541.5592
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	37.632	13.705	2.746	0.006	10.771	64.494
org[T.Police Department]	-0.175	1.289	-0.136	0.892	-2.702	2.352
motiv[T.only discloses information that is]	-3.656	1.263	-2.895	0.004	-6.132	-1.181
tran_fin[T.a lot of]	9.984	1.271	7.857	0.000	7.494	12.475
tran_pm[T.a lot of]	7.317	1.272	5.754	0.000	4.824	9.809
tran_perf[T.a lot of]	13.404	1.286	10.423	0.000	10.883	15.925
educ[T.2]	2.156	5.345	0.403	0.687	-8.321	12.632
educ[T.3]	-3.421	6.158	-0.556	0.579	-15.490	8.649
educ[T.4]	-7.268	8.019	-0.906	0.365	-22.985	8.450
employ_sim[T.retired]	-0.175	8.209	-0.021	0.983	-16.264	15.915
employ_sim[T.working]	9.671	6.411	1.509	0.131	-2.894	22.236
income[T.2]	-4.110	4.911	-0.837	0.403	-13.734	5.515
income[T.3]	2.518	6.033	0.417	0.676	-9.307	14.343
dummy_male	-2.276	4.655	-0.489	0.625	-11.400	6.848
age	2.661	1.647	1.615	0.106	-0.568	5.889
dummy_hisp	-1.643	7.106	-0.231	0.817	-15.571	12.284
dummy_race_black	-3.072	6.643	-0.462	0.644	-16.093	9.948
dummy_govt	3.547	9.136	0.388	0.698	-14.360	21.454
ideol	-1.537	1.906	-0.806	0.420	-5.272	2.198
imp_tran_fin	-3.544	2.646	-1.339	0.180	-8.729	1.642
imp_tran_pm	-1.760	2.943	-0.598	0.550	-7.528	4.008
imp_tran_perf	0.207	3.330	0.062	0.950	-6.319	6.734
conf_median_index	6.575	2.338	2.813	0.005	1.993	11.156
Group Var	329.399	3.508				

85

Table 11: Perc. of Ben. with Controls – Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_ben
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	292.7265
Min. group size:	3	Log-Likelihood:	-3542.5171
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	38.162	12.823	2.976	0.003	13.030	63.295
org[T.Police Department]	-0.434	1.300	-0.334	0.739	-2.981	2.114
motiv[T.only discloses information that is]	-4.479	1.274	-3.516	0.000	-6.976	-1.982
tran_fin[T.a lot of]	8.207	1.282	6.404	0.000	5.695	10.719
tran_pm[T.a lot of]	9.125	1.282	7.116	0.000	6.612	11.639
tran_perf[T.a lot of]	10.838	1.297	8.358	0.000	8.296	13.380
educ[T.2]	3.723	4.997	0.745	0.456	-6.072	13.517
educ[T.3]	-0.960	5.757	-0.167	0.868	-12.245	10.324
educ[T.4]	-7.084	7.498	-0.945	0.345	-21.779	7.611
employ_sim[T.retired]	3.720	7.674	0.485	0.628	-11.321	18.761
employ_sim[T.working]	12.235	5.994	2.041	0.041	0.487	23.983
income[T.2]	-3.838	4.591	-0.836	0.403	-12.837	5.160
income[T.3]	0.749	5.641	0.133	0.894	-10.306	11.805
dummy_male	-2.695	4.352	-0.619	0.536	-11.224	5.835
age	2.199	1.540	1.428	0.153	-0.820	5.218
dummy_hisp	-2.972	6.646	-0.447	0.655	-15.999	10.054
dummy_race_black	-1.840	6.214	-0.296	0.767	-14.019	10.339
dummy_govt	2.245	8.542	0.263	0.793	-14.497	18.986
ideol	-1.847	1.782	-1.037	0.300	-5.339	1.645
imp_tran_fin	-2.999	2.474	-1.212	0.225	-7.847	1.850
imp_tran_pm	-2.527	2.752	-0.918	0.359	-7.921	2.868
imp_tran_perf	0.630	3.113	0.202	0.840	-5.471	6.732
conf_median_index	6.837	2.185	3.128	0.002	2.554	11.120
Group Var	282.656	3.036				

Table 12: Perc. of Eff. with Controls - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_eff
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	307.1514
Min. group size:	3	Log-Likelihood:	-3562.7841
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	36.709	13.308	2.758	0.006	10.627	62.792
org[T.Police Department]	0.152	1.332	0.114	0.909	-2.458	2.763
motiv[T.only discloses information that is]	-1.736	1.305	-1.330	0.184	-4.295	0.822
tran_fin[T.a lot of]	10.221	1.313	7.785	0.000	7.648	12.795
tran_pm[T.a lot of]	5.056	1.314	3.849	0.000	2.481	7.631
tran_perf[T.a lot of]	10.843	1.329	8.161	0.000	8.239	13.447
educ[T.2]	3.265	5.187	0.629	0.529	-6.902	13.431
educ[T.3]	-6.916	5.976	-1.157	0.247	-18.629	4.797
educ[T.4]	-6.891	7.782	-0.886	0.376	-22.144	8.361
employ_sim[T.retired]	6.670	7.966	0.837	0.402	-8.942	22.282
employ_sim[T.working]	16.524	6.221	2.656	0.008	4.330	28.717
income[T.2]	-7.033	4.766	-1.476	0.140	-16.374	2.307
income[T.3]	-0.027	5.855	-0.005	0.996	-11.502	11.449
dummy_male	-2.772	4.517	-0.614	0.539	-11.626	6.082
age	2.449	1.599	1.532	0.126	-0.684	5.583
dummy_hisp	-1.871	6.898	-0.271	0.786	-15.392	11.649
dummy_race_black	-0.317	6.450	-0.049	0.961	-12.958	12.324
dummy_govt	0.840	8.866	0.095	0.924	-16.537	18.218
ideol	-0.947	1.849	-0.512	0.609	-4.571	2.677
imp_tran_fin	-4.383	2.568	-1.707	0.088	-9.415	0.650
imp_tran_pm	-2.290	2.857	-0.802	0.423	-7.889	3.308
imp_tran_perf	0.327	3.231	0.101	0.919	-6.006	6.661
conf_median_index	7.012	2.268	3.091	0.002	2.566	11.458
Group Var	305.569	3.207				

Models to Test H3

Table 13: Impact of Manipulated Variables on Perceptions of Trustworthiness with Controls.

	perc_int	perc_ben	perc_eff
Intercept	37.6322***	38.1623***	36.7095***
	(13.7051)	(12.8228)	(13.3078)
org[T.Police Department]	-0.1748	-0.4337	0.1524
	(1.2892)	(1.2998)	(1.3317)
motiv[T.only discloses information that is]	-3.6564***	-4.4791***	-1.7362
	(1.2631)	(1.2740)	(1.3054)
tran_fin[T.a lot of]	9.9841***	8.2069***	10.2215***
	(1.2707)	(1.2815)	(1.3130)
tran_pm[T.a lot of]	7.3169***	9.1253***	5.0560***
	(1.2717)	(1.2824)	(1.3137)
tran_perf[T.a lot of]	13.4039***	10.8381***	10.8426***
	(1.2861)	(1.2968)	(1.3286)
educ[T.2]	2.1556	3.7227	3.2646
	(5.3451)	(4.9974)	(5.1871)
educ[T.3]	-3.4208	-0.9603	-6.9160
	(6.1581)	(5.7574)	(5.9760)
educ[T.4]	-7.2677	-7.0844	-6.8915
	(8.0192)	(7.4976)	(7.7823)
employ_sim[T.retired]	-0.1747	3.7198	6.6701
	(8.2090)	(7.6741)	(7.9656)
employ_sim[T.working]	9.6708	12.2351**	16.5236***
	(6.4108)	(5.9939)	(6.2214)
income[T.2]	-4.1097	-3.8384	-7.0334
	(4.9106)	(4.5913)	(4.7656)
income[T.3]	2.5177	0.7492	-0.0268
	(6.0332)	(5.6407)	(5.8549)
dummy_male	-2.2760	-2.6945	-2.7722
	(4.6553)	(4.3520)	(4.5173)
age	2.6605	2.1992	2.4492
	(1.6474)	(1.5403)	(1.5987)
dummy_hisp	-1.6435	-2.9723	-1.8710
	(7.1058)	(6.6463)	(6.8983)
dummy_race_black	-3.0723	-1.8401	-0.3171
	(6.6431)	(6.2139)	(6.4495)
dummy_govt	3.5468	2.2448	0.8405
	(9.1363)	(8.5418)	(8.8662)
ideol	-1.5367	-1.8471	-0.9470
	(1.9057)	(1.7816)	(1.8493)
imp_tran_fin	-3.5437	-2.9985	-4.3825*
	(2.6458)	(2.4738)	(2.5678)
imp_tran_pm	-1.7603	-2.5265	-2.2904
	(2.9429)	(2.7522)	(2.8566)
imp_tran_perf	0.2073	0.6301	0.3273
	(3.3299)	(3.1131)	(3.2313)
conf_median_index	6.5748***	6.8369***	7.0118***
	(2.3376)	(2.1854)	(2.2684)
Group Var	1.1466***	0.9656***	0.9948***
	(0.2070)	(0.1774)	(0.1830)

Standard errors in parentheses.

* $p < .1$, ** $p < .05$, ***$p < .01$

Table 14: Perc. of Ben. with Interactions (H3) - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_ben
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	293.1603
Min. group size:	3	Log-Likelihood:	-3587.6711
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P>|z|	[0.025	0.975]
Intercept	41.748	2.880	14.494	0.000	36.103	47.394
org[T.Police Department]	3.749	2.952	1.270	0.204	-2.037	9.536
motiv[T.only discloses information that is]	-2.794	1.862	-1.501	0.133	-6.442	0.855
tran_fin[T.a lot of]	9.888	1.844	5.362	0.000	6.273	13.502
tran_pm[T.a lot of]	10.501	1.829	5.740	0.000	6.915	14.086
tran_perf[T.a lot of]	10.932	1.834	5.959	0.000	7.336	14.527
org[T.Police Department]:tran_fin[T.a lot of]	-3.149	2.595	-1.214	0.225	-8.235	1.936
org[T.Police Department]:tran_pm[T.a lot of]	-2.041	2.586	-0.789	0.430	-7.110	3.027
org[T.Police Department]:tran_perf[T.a lot of]	-0.337	2.570	-0.131	0.896	-5.375	4.701
org[T.Police Department]:motiv[T.only discloses information that is]	-3.044	2.621	-1.162	0.245	-8.180	2.092
Group Var	336.993	3.276				

Table 15: Perc. of Int. with Interactions (H3) - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_int
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	286.9859
Min. group size:	3	Log-Likelihood:	-3584.9164
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P>|z|	[0.025	0.975]
Intercept	40.122	2.926	13.712	0.000	34.387	45.857
org[T.Police Department]	2.260	2.923	0.773	0.440	-3.470	7.990
motiv[T.only discloses information that is]	-2.607	1.843	-1.414	0.157	-6.220	1.006
tran_fin[T.a lot of]	12.008	1.826	6.577	0.000	8.430	15.587
tran_pm[T.a lot of]	8.649	1.811	4.775	0.000	5.099	12.200
tran_perf[T.a lot of]	11.932	1.816	6.569	0.000	8.372	15.492
org[T.Police Department]:tran_fin[T.a lot of]	-3.641	2.569	-1.417	0.156	-8.677	1.395
org[T.Police Department]:tran_pm[T.a lot of]	-2.382	2.561	-0.930	0.352	-7.401	2.636
org[T.Police Department]:tran_perf[T.a lot of]	2.827	2.545	1.111	0.267	-2.161	7.814
org[T.Police Department]:motiv[T.only discloses information that is]	-1.688	2.595	-0.650	0.515	-6.775	3.399
Group Var	374.515	3.639				

Table 16: Perc. of Eff. with Interactions (H3) - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_eff
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	308.1974
Min. group size:	3	Log-Likelihood:	-3612.3776
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P>|z|	[0.025	0.975]
Intercept	39.653	3.013	13.160	0.000	33.747	45.558
org[T.Police Department]	3.337	3.029	1.101	0.271	-2.600	9.273
motiv[T.only discloses information that is]	-0.759	1.910	-0.398	0.691	-4.504	2.985
tran_fin[T.a lot of]	11.478	1.892	6.067	0.000	7.770	15.186
tran_pm[T.a lot of]	6.426	1.877	3.424	0.001	2.748	10.104
tran_perf[T.a lot of]	11.025	1.882	5.859	0.000	7.337	14.714
org[T.Police Department]:tran_fin[T.a lot of]	-2.365	2.662	-0.888	0.374	-7.582	2.852
org[T.Police Department]:tran_pm[T.a lot of]	-2.127	2.653	-0.802	0.423	-7.327	3.073
org[T.Police Department]:tran_perf[T.a lot of]	-0.430	2.637	-0.163	0.870	-5.598	4.738
org[T.Police Department]:motiv[T.only discloses information that is]	-1.776	2.690	-0.660	0.509	-7.047	3.496
Group Var	390.381	3.677				

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Models to test H4

Table 17: Perception of Integrity (H4) - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_int
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	288.2748
Min. group size:	3	Log-Likelihood:	-3589.0843
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	41.678	2.769	15.051	0.000	36.250	47.105
org[T.Police Department]	-0.256	1.303	-0.197	0.844	-2.811	2.298
motiv[T.only discloses information that is]	-3.640	1.267	-2.872	0.004	-6.124	-1.156
tran_fin[T.a lot of]	10.440	2.148	4.860	0.000	6.230	14.651
tran_pm[T.a lot of]	7.046	2.148	3.280	0.001	2.835	11.256
tran_perf[T.a lot of]	13.038	2.140	6.094	0.000	8.845	17.232
tran_fin[T.a lot of]:tran_pm[T.a lot of]	-0.516	2.544	-0.203	0.839	-5.501	4.469
tran_fin[T.a lot of]:tran_perf[T.a lot of]	-0.714	2.588	-0.276	0.783	-5.787	4.359
tran_pm[T.a lot of]:tran_perf[T.a lot of]	1.351	2.552	0.530	0.596	-3.650	6.353
Group Var	376.109	3.646				

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Table 18: Perception of Benevolence (H4) - Mixed Linear Model Regression Results

Model:	MixedLM	Dependent Variable:	perc_ben
No. Observations:	819	Method:	REML
No. Groups:	103	Scale:	292.6068
Min. group size:	3	Log-Likelihood:	-3589.8547
Max. group size:	8	Converged:	Yes
Mean group size:	8.0		

	Coef.	Std.Err.	z	P> |z|	[0.025	0.975]
Intercept	44.775	2.716	16.483	0.000	39.451	50.098
org[T.Police Department]	-0.721	1.312	-0.550	0.583	-3.292	1.850
motiv[T.only discloses information that is]	-4.459	1.276	-3.494	0.000	-6.961	-1.958
tran_fin[T.a lot of]	8.520	2.163	3.939	0.000	4.280	12.759
tran_pm[T.a lot of]	7.254	2.163	3.354	0.001	3.015	11.493
tran_perf[T.a lot of]	10.476	2.154	4.863	0.000	6.254	14.698
tran_fin[T.a lot of]:tran_pm[T.a lot of]	1.467	2.561	0.573	0.567	-3.553	6.487
tran_fin[T.a lot of]:tran_perf[T.a lot of]	-2.767	2.606	-1.062	0.288	-7.875	2.341
tran_pm[T.a lot of]:tran_perf[T.a lot of]	3.067	2.570	1.193	0.233	-1.970	8.103
Group Var	340.598	3.310				

Appendix D　Robustness Check

D.1　Multicollinearity of the Predictors

Table 19: Variance Inflation Factors (VIF) for the Predictors in the Regression Model

Variable	VIF
Intercept	10.1721
org[T.Police Department]	1.03437
motiv[T.only discloses information that is]	1.03228
tran_fin[T.a lot of]	2.86867
tran_pm[T.a lot of]	2.87567
tran_perf[T.a lot of]	2.80665
tran_fin[T.a lot of]:tran_pm[T.a lot of]	2.9547
tran_fin[T.a lot of]:tran_perf[T.a lot of]	2.49192
tran_pm[T.a lot of]:tran_perf[T.a lot of]	2.75951

3 Measuring Trust in Government Through Social Media

Measuring Trust in Government Through Social Media

Juan Pablo Ripamonti

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Abstract

Trust in government is integral to the functioning of democratic systems, impacting areas like policy adherence and economic well-being. Surveys, traditionally used to assess public trust, have limitations including potential response biases, costs, sporadic data collection, and an emphasis on major governmental entities

This article proposes a supplementary approach, analyzing Twitter-based social media behaviors, to measure public trust in key U.S. government entities. Using machine learning techniques, I develop trust indicators based on Twitter behavior. The preliminary findings suggest modest correlations between these indicators and traditional survey measures in certain demographics. The paper provides a balanced perspective on the potential and challenges of these social media-derived indicators in capturing nuances of public trust.

1 Introduction

Healthy democracies rest upon the foundation of a trustworthy government. When citizens trust their government, many desirable outcomes follow: participation (Cuthill & Fien, 2005), compliance with laws and regulations (Ayres & Braithwaite, 1992; Levi, 1997; Tyler, 1998), interpersonal trust, and overall

prosperity (Fukuyama, 1995; Inglehart, 1999; Putnam, 2000). Current measures of trust primarily rely on surveys like the World Values Survey and the American National Election Studies. However, the scope and frequency of surveys present limitations in capturing dynamic trust shifts and the spectrum of governmental entities.

Surveys, while reliable, predominantly focus on major public bodies, such as the Government and Congress. This focus neglects the broader range of governmental agencies that citizens interact with daily. Additionally, due to resource constraints, surveys are often administered annually or bi-annually, at most, potentially missing rapid changes in public sentiment. Given these limitations, an alternative method which could capture a more holistic and dynamic measure of trust, would be a valuable tool for researchers and practitioners.

Recent increase in the availability of digital text and computational power have bolstered the capacity of Natural Language Processing (NLP) models of extracting insights from unstructured text. Within social sciences, these tools have been instrumental in analyzing bureaucratic reputation (Anastasopoulos & Whitford, 2019), political polarization (Peterson & Spirling, 2018), and policy salience (Barberá et al., 2019). Yet, their application to the study of public trust remains limited, despite its significant role in social science discourses. This study addresses this lacuna by studying the feasibility of using machine learning-based text classification of social media data to quantify trust in government. Using Twitter data, I employ two different machine learning models to infer both perceptions of government trust and twitter user demographics, and I build indicators and compare them to survey-based measures.

This paper is structured in the following way. First, I will delve into the relationship between trust in government and how it's currently measured, exploring the literature around traditional trust metrics and the emergence of

social media data analytics in the field of political science. I then elaborate on my methodological approach, leveraging machine learning to extract insights from Twitter, or "X" as it's now called, and contrast these findings with conventional survey-based measures. Through three case studies, I test the validity my approach, followed by a discussion on its potential, challenges, and implications. I conclude by reflecting on the broader landscape of trust measurement in our increasingly digital age.

2   Literature Review

Although scholars define trust in many ways, there is some consensus in that it entails a social relation in which an actor (the trustor) is willing to make itself vulnerable to another actor (the trustee) (Levi & Stoker, 2000). Citizens' trust in government, therefore, describes the social relation in which citizens are the trustors and the government is the trustee. As it is apparent, citizens willingness to make themselves vulnerable to the government is an inner state of the mind, therefore the presence or intensity of this inner state cannot be measured directly. Yet, researchers can get a sense of how people feel about the government through different indirect methods such as experiments and surveys. Surveys are the most common way to do it. Through survey responses, researchers can infer if and how much citizens trust in different public entities.

Diverse strategies exist to gauge sentiments towards government institutions via surveys. Respondents might be asked about the frequency of their trust in the government to act correctly or their perceptions of potential governmental financial mismanagement (American National Election Studies, 2021). Another strategy prompts individuals to rank their confidence in those running distinct public institutions, encompassing the Government, Police, and Parliament (Smith et al., 2019). Interpretation and quantification methods for these

survey responses vary. One common method measures trust by evaluating the proportion of respondents indicating the highest trust level in a survey (e.g. Torcal, 2017). Conversely, some approaches generate an additive index, integrating responses related to government efficiency, integrity, and benevolence (see Zmerli & van der Meer, 2017). In other words, while each method sheds light on certain dimensions of the trust relation (e.g.efficiency), they can inadvertently sideline or underrepresent others. Trust, being multifaceted, is not easily encapsulated by a singular metric or approach. Given these inherent methodological trade-offs, no single approach can claim comprehensive coverage of the trust landscape. This underscores the potential value of diversifying our measurement tools, such as integrating insights from social media, to complement our understanding of trust dynamics.

In recent years, with the proliferation of digital technologies and platforms, social media has emerged as a source of data for understanding societal sentiments and behaviors (Tufekci, 2014). Twitter, now rebranded as X, stands as a leading microblogging platform where users share their perspectives through "tweets" (Bekafigo & McBride, 2013).Beyond its communicative function, X has become a political arena, driving researchers to extract insights from it concerning public opinion and political behavior (Barberá, 2015). Researchers in diverse fields use this data to infer characteristics of users, such as their ideological positions (e.g., Castanho Silva & Proksch, 2022; Colleoni et al., 2014; Souza et al., 2017), and demographic characteristics(v.g., Kostakos et al., 2018; Pennacchiotti & Popescu, 2021).

In conclusion, while traditional survey-based methods provide a robust and time-tested means of gauging public trust, the dynamic nature of social media offers an opportunity to capture the ever-evolving nuances of public sentiment towards government entities. Mixing these two approaches could provide a

richer, more holistic view of trust in contemporary society.

3 Methodology

To produce measures on trust, data was collected from Twitter. Twitter was chosen for two primary reasons: it is one of the most widely-used social media platforms, and its data was freely accessible at the time of the collection. The data was sourced using the Twitter API, accessed through the Tweepy Python library (Harmon et al., 2023). For a given entity, the query was designed to retrieve relevant mentions of that entity spanning from March 21, 2006, to May 1, 2023.

Retweets, replies, quotes, and tweets containing links were excluded. This decision aligns with the objective of capturing self-originated sentiments about government entities. Retweets and quotes often reflect endorsement or sharing of others' viewpoints, rather than expressing personal opinions. Replies, while potentially insightful, are part of larger conversations and present analytical challenges due to their contextual dependencies. Tweets with links are excluded to ensure the focus remains on the text-based content, as links often lead to external material that could alter the interpretation of the tweet.

In addition, data was collected from Twitter user profiles, which included profile images, user names, and self-descriptive text. These elements were utilized in a machine learning tool (M3 Inference) to infer user demographics. Developed by researchers from Stanford University and the University of Oxford, this Python package leverages both profile images and textual descriptions to infer demographic characteristics of social media users (Wang et al., 2019).[1]

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[1]M3 Inference stands for "Multimodal, Multitask, and Multilingual Inference". The tool uses images and text to predict age, gender, and other attributes. This approach surpasses the performance of previous methods and effectively addresses algorithmic biases, as demonstrated in prior research (Yousefinaghani et al., 2023) and (Aisenpreis et al., 2023). Its codebase and more information can be found with the identifier `m3inference` at https://pypi.org/.

This approach enables a comparison of indicator values based on demographics with survey data for corresponding groups. While recognizing the potential biases and inaccuracies inherent in machine learning inferences, this method offers a way for validating and contextualizing social media data.

Geographic information, comprising self-reported locations and geographic coordinates, was used for focusing the analysis on U.S.-based users, in line with the study's analysis of U.S. government entities. Available geographic coordinates were matched against the United States' geographic boundaries using Natural Earth data (Version 5.1.1) ("Administrative Boundaries (Version 5.1.1)", 2023). In cases without coordinates, the open-text location field, filled in optionally by users, was analyzed using automated textual analysis to identify references indicative of a U.S. location. This procedure was specifically designed to exclude users not estimated to be in the U.S., thereby ensuring the geographic relevance of the data.

To enhance the quality and relevance of the data, tweets from users identified as bots were excluded. This was accomplished by utilizing the dataset from Feng et al. (2023), which was chosen for its comprehensive coverage of bot accounts. The selection of this dataset was an alternative to more advanced bot detection tools like Botometer, which have become costly. Despite these limitations, the identification of bot accounts, while not the central focus, contributes to the overall integrity of the analysis

Using the state-of-the-art BART Model by Facebook AI, specifically designed for natural language processing tasks (Lewis et al., 2019)[2], this study employed a focused approach to infer trust in government from Twitter data. The BART model was tasked with analyzing tweets that directly reference government entities, classifying them based on whether they demonstrate trust, lack

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[2]BART, which stands for Bidirectional and Auto-Regressive Transformers, is available on the HuggingFace model hub under the identifier `facebook/bart-large-mnli`.

of trust, or neutrality regarding trust. To maintain the rigor of the analysis, tweets that were ambiguous or unclear about trust were systematically excluded. This ensured that the study focused on messages with clear stances. As part of the preprocessing, unwanted characters were removed from the tweets, enabling the BART model to perform a more precise and focused textual analysis.

To ensure that the algorithms effectively captured the sentiments of tweets, tweets were filtered based on the classifier's confidence, with a threshold set at 0.7. This step ensures a focus on tweets most likely representing strong sentiments, thus reducing potential noise from ambiguous classifications. To refine the demographic analysis and draw parallels with the GSS data, the m3inference model was employed on the Twitter dataset to infer users' age group and gender. These inferred probabilities were then utilized to weight each user's contribution to their respective demographic categories. For instance, if a user's tweet was inferred with a probability of 0.9 of being male and exhibited a trust measure of 0.7, it would contribute 0.63 to the male aggregate for the period, and 0.07 to the female aggregate. This method ensures a representation based on the expected values, allowing for more accurate contributions based on the probabilistic outputs.

Proposed Indicators of Trust

The zero-shot classification approach was employed to categorize tweets based on trust in the government entity mentioned (US Federal Government, US Congress, and US Supreme Court). The design of these categories was influenced by existing frameworks and the objective of capturing sentiment effectively. On the other hand, the trust theme was crafted for simplicity, resulting in categories like "trusting", "lacking trust", and a residual category for "unclear trust" towards the government entity. This approach aimed to maximize

clarity and accuracy in capturing the sentiment expressed in the tweets. To distill the sentiments from these classifications into meaningful indicators, two distinct methods were employed:

1. Ratio-Based Indicators: Two ratios were constructed to reflect sentiments of trust and confidence. For trust, the ratio is determined by the relationship:

$$\text{Trust Ratio} = \frac{\text{N. of tweets with trusts the ORG}}{\text{N. of tweets with lacks trust in the ORG}} \tag{1}$$

$$\text{Confidence Ratio} = \frac{\text{N. of tweets with great deal of confidence in the ORG.}}{\text{N. of tweets with hardly any confidence in the ORG.}} \tag{2}$$

These ratios provide a straightforward comparative metric, emphasizing the balance between positive and negative sentiments.

2. Net Trust Score (NTS): The NTS offers a nuanced representation of trust sentiment, giving a continuous score between -1 and 1. This balanced representation remains consistent across varying tweet volumes, ensuring meaningful, comparable metrics, irrespective of the number of mentions a government entity might have. The NTS model is inspired by the Net Promoter Score, a recognized metric in marketing (Reichheld, Frederick F., 2003).

Aggregated metrics were generated by computing average values per user per year. This approach was adopted to account for variations in tweeting frequency among users. These newly proposed indicators, while annual in design, offer the potential for more frequent (e.g., monthly) updates. They are intended to complement existing survey-based metrics for government entities that are already assessed through traditional means. However, for smaller entities not traditionally covered in such surveys, these indicators could serve as the primary measurement tool.

Currently, no benchmarking methods have been applied to validate these indicators. Their construction implies sensitivity to shifts in online discourse or platform-based changes on Twitter. The accuracy of the zero-shot classification in accounting for nuances like sarcasm or cultural linguistic variations remains a topic of further investigation.

4 Case Studies and Validation

The selection of the case studies—comprising the United States Federal Government, the United States Congress, and the United States Supreme Court—was underscored by both their representative nature and the heightened public interest they naturally elicit. These entities collectively represent the three main branches of the government, thus offering a comprehensive purview of trust indicators across distinct governmental sectors. Their importance in the nation's governance and the widespread discussions they inspire on social media platforms make them apt subjects for this exploration. The validation process centers around juxtaposing trust indicators derived from Twitter data, as presented in the preceding section, with traditional benchmarks from the General Social Survey (GSS). This approach ensures a nuanced understanding of the efficacy and applicability of the proposed trust indicators.[3]

The visual inspection of the trust ratio time series data hinted at a discernible seasonality. To substantiate this observation, the Autocorrelation Function (ACF) seasonal component was plotted for each of the three government entities. The "Autocorrelation Function", which measures the linear relationship between lagged values of a time series, showa how trust values are correlated

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[3]For this version of the paper, our focus is on one of the Ratio-Based Indicators, specifically the one operationalized using the term "trust". The other variant utilizes "confidence" with different classification categories, and while the overarching results are analogous, it is not elaborated upon here. Additionally, we integrate the Net Trust Score and sentiment analysis into our framework for robustness checks. To further enhance the model, I will fine-tune it using a sample of 100–200 cases and evaluate its accuracy accordingly.

(a) US Congress
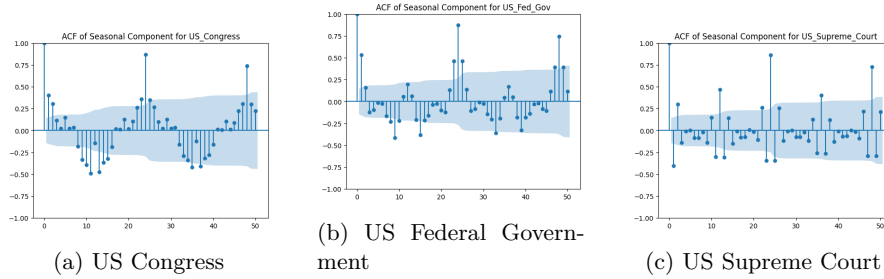
(b) US Federal Government

(c) US Supreme Court

Figure 1: Seasonal Decomposition of Trust Ratios for the US Federal Government, Congress, and Supreme Court.

with their past values, revealing patterns of seasonality in the data. In this case, Trust Ratios from Twitter, show a discernible seasonality emerged with a two-year periodicity which coincides with US Federal election cycles (See Figure 1).

Decomposing the trust ratios into distinct components -trend, seasonal, and residual -facilitates a clearer understanding of the underlying dynamics. While the seasonal component captures periodic fluctuations, the trend component encapsulates the more stable, longer-term direction in the data. This trend component becomes particularly pivotal when drawing comparisons with GSS data, as it offers a consistent basis for juxtaposition without the oscillations of seasonality. The specific trust ratio trend plots for the US Federal Government, US Congress, and US Supreme Court are visualized in Figures 2,3, and4, respectively.

Across our three case studies, some distinct patterns emerged, revealing the nuanced relationship between Twitter-derived trust ratios and traditional GSS measures for different U.S. government entities. For the US Federal Government, a discernible disparity is evident between age groups and genders. Notably, females in the 19–29 bracket registered a strong Pearson correlation of 0.915 (p-value = 0.004), a trend not mirrored in their male counterparts. Similarly, the 30–39 age bracket showed divergent correlations based on gender,

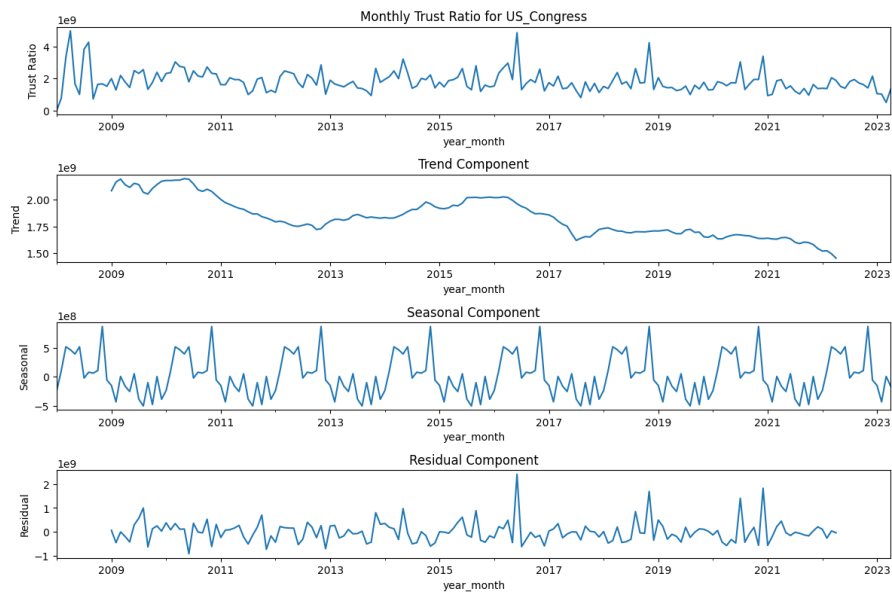Figure 2: Trust Ratio Decomposition for the US Federal Government.

Figure 3: Trust Ratio Decomposition for the US Congress.

Figure 4: Trust Ratio Decomposition for the US Supreme Court.

with males showing a higher Spearman correlation than females. This distinction between genders was also evident in the below-18 category. However, the older age group (40 and above) revealed an overarching theme: the lack of statistically significant correlations across the datasets, suggesting possible data representation or behavior discrepancies for this cohort on social platforms like Twitter. (Refer Table 1).

In contrast, the US Supreme Court analysis depicted more modest correlations, especially next to the Federal Government findings. The highest correlation, a Spearman value of 0.47, was identified among females aged 19–29, yet it missed the threshold for statistical significance. Such subdued correlations were consistent across all age groups, with no demographic revealing strong alignment between the Twitter trust ratios and GSS metrics. This might reflect a more consistent public perception or perhaps a less dynamic sentiment towards the judiciary compared to the executive. (See Table 2).

Table 1: Correlation Analysis for Federal Government

Group (Age, Gender)	Pears. Corr	Pears. p-value	Spear. Corr.	Spear. p-value
19-29, FEMALE	0.915	0.004	0.893	0.007
19-29, MALE	0.701	0.079	0.679	0.094
30-39, FEMALE	0.809	0.027	0.786	0.036
30-39, MALE	0.694	0.083	0.929	0.003
≤18, FEMALE	-0.789	0.035	-0.778	0.039
≤18, MALE	0.092	0.844	0.315	0.491
≥40, FEMALE	0.48	0.276	0.5	0.253
≥40, MALE	0.546	0.204	0.357	0.432

Table 2: Correlation Analysis for US Supreme Court

Group (Age, Gender)	Pears. Corr	Pears. p-value	Spear. Corr.	Spear. p-value
19-29, FEMALE	0.398	0.159	0.47	0.09
19-29, MALE	0.271	0.348	0.39	0.168
30-39, FEMALE	0.328	0.253	0.354	0.214
30-39, MALE	0.296	0.305	0.337	0.239
≤18, FEMALE	-0.087	0.767	-0.156	0.594
≤18, MALE	-0.175	0.55	-0.049	0.867
≥40, FEMALE	0.061	0.835	0.142	0.629
≥40, MALE	0.07	0.811	0.124	0.673

When analyzing the US Congress, the results closely resembled those of the Supreme Court but with a few distinctions. The younger female demographic, 19–29, stood out with a Spearman coefficient nearing significance. This was contrasted by their male counterparts and other age brackets that mostly exhibited minimal and non-significant correlations. The almost significant result in males aged 40 and above resonated with the patterns observed in the Federal Government analysis, hinting at a potential common underlying factor or behavior trend in this age group's social media interactions. (Consult Table 3).

Our case studies underscore the complexities inherent in using social media data as a proxy for trust in government entities, particularly next to established measures like the GSS. While certain demographics revealed interesting correlations, the overarching narrative suggests that Twitter-derived trust in-

Table 3: Correlation Analysis for US Congress

Group (Age, Gender)	Pears. Corr	Pears. p-value	Spear. Corr.	Spear. p-value
19-29, FEMALE	0.287	0.207	0.417	0.06
19-29, MALE	0.225	0.327	0.342	0.129
30-39, FEMALE	0.104	0.653	0.13	0.575
30-39, MALE	0.079	0.735	0.114	0.623
≤18, FEMALE	0.114	0.624	0.202	0.379
≤18, MALE	0.203	0.378	0.196	0.394
≥40, FEMALE	0.043	0.852	0.035	0.879
≥40, MALE	0.31	0.171	0.421	0.058

dicators often deviate from traditional GSS benchmarks. This divergence is especially conspicuous for older demographics (40 and above), where consistent non-correlations across all entities suggest the lack of representation and engagement of this group on Twitter. It serves as a reminder of the limitations of digital data, which, while capturing the real-time sentiment, may not resonate with comprehensive, traditionally collected datasets.

After analyzing the demographic nuances, it's also useful to step back and look at the broader picture. Beyond the granular demographic-level analysis, a trend comparison between the GSS trust ratios and the Twitter-derived trust ratios for each governmental entity provides some insights. When we consider a broader trend comparison between the GSS trust ratios and the Twitter-derived trust ratios for each governmental some interesting patterns emerge.

For the US Supreme Court, both GSS and Twitter trends depict fluctuations, with GSS displaying a significant dip in trust ratios in the latter years, especially in 2022. This general decline is also echoed in the Twitter data trend component for the same period. The US Federal Government trends, both from the GSS and Twitter, also exhibit a decreasing trajectory, although the magnitude of decline is not as pronounced in the Twitter data as it is in the GSS. The US Congress, on the other hand, presents a more stable trust ratio in the GSS data

over the years, with a slight dip towards the recent years. The Twitter trend for the Congress, while relatively more fluctuant, also shows a general decline.

These patterns, showcased side-by-side in Figures 6,5, and7, underscore a possible converging sentiment towards these entities over time. However, it is worth noting that while the general directional trends might coincide, the magnitude, nuances, and specific inflection points differ. This divergence could stem from the different nature and limitations of the two datasets – while GSS provides a more traditional, survey-based perspective, Twitter captures real-time sentiments which can be influenced by immediate events and discourses. Thus, while the side-by-side comparison provides a valuable visualization of overall trust sentiments over time, drawing exact parallels requires caution.
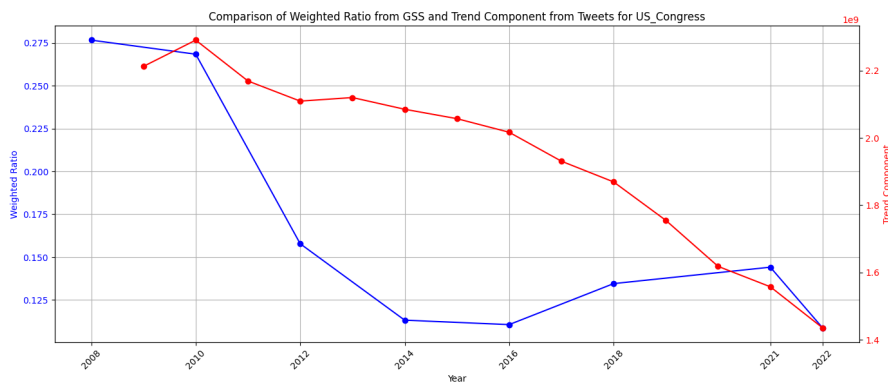
Figure 5: Comparison of GSS Ratios and Twitter Trend for the US Congress.

In conclusion, comparing Twitter-derived trust indicators with traditional GSS benchmarks reveals a complex picture of public trust in government entities. While there are clear similarities in general trends over time, they are contrasted by significant differences when looking at specific demographics and sentiment shifts. These differences underscore the importance of being careful when using digital data sources like Twitter. While they provide a unique view into real-time feelings, they should not be seen as a replacement for tradi-
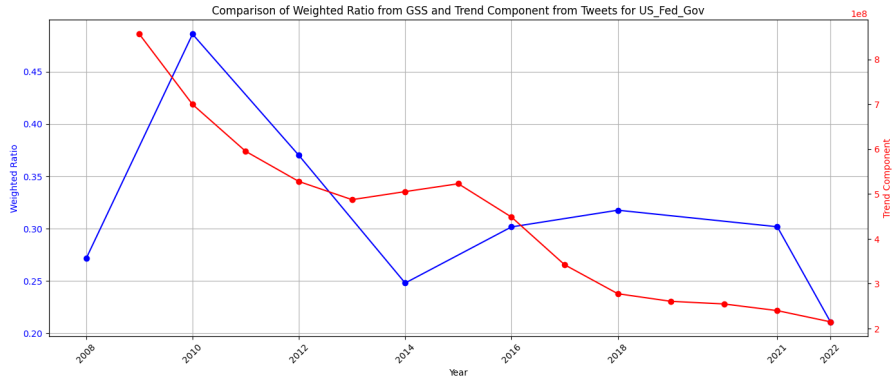
Figure 6: Comparison of GSS Ratios and Twitter Trend for the US Federal Government.
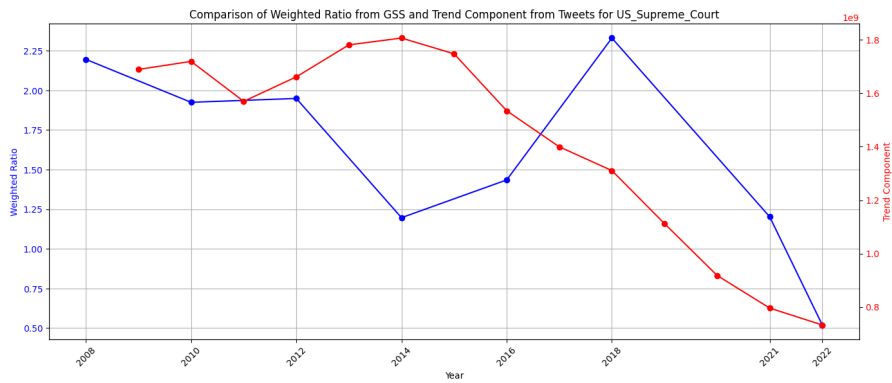

Figure 7: Comparison of GSS Ratios and Twitter Trend for the US Supreme Court.

tional measures. Instead, their strength might be in adding depth and detail to our understanding, rather than taking the place of established trust indicators. With these insights, we move forward to discuss the broader implications of our findings and how they fit into the larger conversation about measuring public trust in government institutions.

5 Discussion

Building on the exploration of using ratio-based indicators from Twitter data to measure public trust, the analysis of the United States Federal Government, Congress, and the Supreme Court provided valuable insights. The findings show the some potential of this approach but also bring forth several challenges.

This study affirmed concerns from existing literature about the representativeness of social media data. For example, the significant discrepancies observed between Twitter-derived trust indicators for older demographics (40 and above) and GSS benchmarks underscore that certain demographics might be underrepresented or less engaged on Twitter (Lohmann & Zagheni, 2023).

One strength of the social media approach, as the findings suggest, is the capability to capture real-time sentiment shifts. This is evident from the episodic sentiment bursts correlated with key events and crises, especially those linked with the US Federal election cycles. However, this dynamism also introduces metric variability, presenting both opportunities and challenges for sentiment analysis (Xu et al., 2022).

Our juxtaposition of Twitter-derived trust ratios with traditional GSS benchmarks showed interesting patterns. While entities like the US Supreme Court and the US Federal Government showed a decreasing trust trend in both datasets, the US Congress's trust ratio in Twitter data declined compared to the stable trust ratio observed in the GSS. Such differences emphasize the need for comprehensive triangulation when drawing insights from diverse data sources.

Demographic-specific insights, such as the disparity observed in trust ratios between genders for the US Federal Government and the more uniform correlations across age groups for the US Supreme Court, further emphasize the complexities involved. Such disparities indicate that while social media provides granular insights, these should be cautiously interpreted, especially when

generalizing for the broader population.

Notwithstanding the challenges, our exploration points to potential avenues. For instance, even though smaller, less-visible government organizations might not be the focus of traditional surveys, Twitter-derived metrics might offer valuable sentiment insights. This aligns with the trajectory suggested by computational social science, wherein digital platforms potentially reshape our understanding of public opinion (Mossberger et al., 2013).

The study reiterates that while social media-derived trust indicators provide a fresh lens to gauge public sentiment, they must be interpreted alongside traditional metrics. The confluence of both methods promises a richer, more nuanced understanding of public trust in today's digital age, enhancing rather than replacing traditional paradigms.

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