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From Policy to Trust:
A Regression Discontinuity Analysis

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From Policy to Trust: A Regression Discontinuity Analysis

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Abstract

Public trust in government promotes compliance with policies, but whether effective policies, in turn, can build trust remains understudied. Using a regression discontinuity design based on Japan's COVID-19 vaccine prioritization at age 65, we estimate the causal impact of the policy on trust in government. Vaccination significantly increased trust in local governments responsible for policy execution, while leaving trust in the central government unchanged. The effect is driven by the tangible experience of receiving the vaccine, not by expectations shaped by policy initiation. Our findings suggest that effective, well-executed policies can build trust and incentivize governments to ensure policy completion.

Keywords: Policy implementation, Political trust, Central and local government, COVID-19 vaccination, Natural experiment
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1. Introduction

How can the governments build trust among the public? Despite widespread belief across economics, sociology, and political science that public trust is essential for effective governance, empirical answers to this question remain limited. This gap is particularly concerning given long-standing evidence that higher trust correlates with more efficient and responsive governance: For example, Arrow (1972) emphasizes trust's role in economic transactions, and Putnam (1993) links trust to differences in U.S. state government performance. Trust is also critical for addressing governance challenges stemming from information asymmetry between governments and citizens—a classic principal-agent problem that cannot be easily resolved through incentive-based solutions in the mission-driven public sector (Besley and Dray, 2024; Tirole, 1994). Although the value of trust in government is well recognized, there is limited empirical evidence addressing the question posed at the outset.

As a first step toward answering this broader question, this study focuses specifically on the causal link from policy responsiveness—particularly, the implementation of policies that align with citizens' expectations—to public trust. We build on prior work exploring the sources of political trust. A seminal paper by Hetherington (1998) defines political trust as the belief that *"how well the government is operating according to people's normative expectations."* Following this definition, one plausible hypothesis is that trust increases when the government fulfills citizens' expectations. Such expectations reflect self-interest as well as collective welfare (Fehr and Schmidt, 2006; Fong, 2001). This hypothesis is commonly assumed or taken for granted (Algan and Cahuc, 2013; Besley and Dray, 2024; Knack and Keefer, 1997; Ligthart and van Oudheusden, 2015); however, it has rarely been tested empirically.

To test this hypothesis, we provide quasi-experimental evidence on whether the implementation of a publicly anticipated vaccination policy during the COVID-19 pandemic increased public trust in government. The pandemic, one of the most severe global health and socioeconomic crises in recent history, has highlighted the importance of trust: prior research shows that higher trust levels led to lower mortality and greater compliance with public health measures (Barrios et al., 2021; Elgar, Stefaniak and Wohl, 2020; Oksanen et al., 2020; Sternberg, Steinert and Büthe, 2024). Using this global crisis as a context, we extend previous research that primarily emphasized the conventional pathway from trust to compliance by providing evidence for a reverse pathway—from policy implementation to increased trust. Specifically, we employ a Regression Discontinuity Design, leveraging the characteristics of Japan's COVID-19 vaccination policy, which uniformly prioritized individuals aged 65 years and older across all municipalities. Japan's policy combined institutional features common across countries with unique characteristics that make it particularly suitable for causal analysis with a Fuzzy RDD.

Our findings provide an important contribution toward understanding how governments can build public trust in practice. Vaccination increased trust in local governments responsible for administering the policy, while having no significant impact on trust in the central government. Given the substantial impact of the pandemic on women's mental health, gender-specific analyses reveal that both trust in local government and mental health improved among women. Mediation analysis indicates that the observed increase in trust was driven by the tangible benefits of receiving a vaccine rather than by anticipatory effects from policy design and initiation alone. Furthermore, even in the pre-vaccination stage—when individuals have already secured a reservation and should, under rational expectations, anticipate higher utility than when their vaccination was still uncertain—trust actually declines, suggesting behavioral mechanisms beyond rational expectations.

The finding that trust is shaped by how policies are implemented gives governments incentives to pursue effective policies. Higher trust can increase policymakers' private returns, such as reelection prospects; even self-interested policymakers would have incentives to implement appropriate policies (Besley and Dray, 2024). Moreover, mere policy initiation is insufficient; policy completion is essential, indicating that rhetorical promises alone cannot foster trust. Accumulating evidence that policy follow-through builds trust can help address problems between governments and citizens.

The structure of this paper is as follows: Section 2 reviews the literature examining and clarifies

how the present study contributes to this field. Section 3 provides an overview of Japan's vaccination policy and the research design. In Section 4, we apply a fuzzy regression discontinuity design to examine the impact of the vaccination policy on trust, with a focus on its relationship to gender and mental health. Section 5 explores the pathways through which trust increases, specifically analyzing the effects of policy anticipation. Section 6 discusses the results, and Section 7 concludes with a discussion of the policy implications.

2. Literature Review

A limited number of studies have examined the causal link from policy implementation to trust because, as Hetherington (1998) notes, the relationship between policy and trust is bidirectional and dynamically shaped over time, complicating both theoretical modeling and empirical identification. Establishing causality requires approximate experimental conditions—something that is rarely feasible in real-world policy contexts. To date, empirical studies have been confined to specific topics, such as the COVID-19 pandemic events and cash transfers.

The COVID-19 pandemic created an unusually valuable setting for this causal inference: public policies such as lockdowns and vaccination rollouts were implemented in ways that introduced as-if-random variation—across time, regions, and age groups. Some studies treated lockdown policies in the early stages of the pandemic as exogenous interventions and examined their impact on political trust (Bol et al., 2021; Oude Groeniger et al., 2021). While these studies offered early insights, their findings face critical limitations. They reported that citizens' positive evaluations of lockdowns contributed to increased trust in governments. However, this apparent increase in trust was confounded by the "rally-round-the-flag" effect—a well-documented phenomenon in which, during national crises, citizens tend to temporarily show stronger support for the government to overcome the crisis, regardless of actual policy effectiveness (Mueller, 1970). Subsequent research has demonstrated that the observed increase in trust does not hold after adjusting for the rally-round-the-flag effect (Schraff, 2021; van der Meer, Steenvoorden and Ouattara, 2023). Moreover, there are conceptual reasons to doubt whether lockdowns are suitable for trust-building. Because lockdowns restrict economic and social activity, they inherently force a trade-off between infection control and the economy (Adams-Prassl et al., 2022; Altindag, Erten and Keskin, 2022; Banks, Fancourt and Xu, 2021; Brodeur, Grigoryeva and Kattan, 2021). The perceived costs of lockdowns, such as job loss and social isolation, may exceed their health benefits. Thus, such policies may even undermine trust in government. This highlights a key limitation: lockdowns may not provide a suitable context for identifying a clean causal link from policy to trust.

Our study focuses on COVID-19 vaccination policies and addresses these challenges. First, vaccinations were administered not during the initial phase of the pandemic, but at a later stage when the rally-round-the-flag effect had largely subsided. This timing allows for a clearer distinction between trust rooted in general crisis sentiment and trust generated by specific policy action. Second, unlike lockdowns, vaccination policies aimed to achieve both infection control and the resumption of economic activity, making them more likely to foster public trust (Cutler and Summers, 2020; Sevilla et al., 2024).

No prior study has directly examined the causal impact of vaccination policies on trust in government. In contrast, in the medical and public health literature, several studies have used natural experiments to evaluate the effectiveness of vaccination in reducing COVID-19 infections (Bermingham et al., 2021; Greene et al., 2022; Kennedy-Shaffer, 2024; Mukherjee et al., 2022). Only a few studies have examined relevant outcomes such as evaluations of government performance and mental health. Takaku et al. (2025), for example, analyzes Japan's vaccination priority policy for the elderly using an age-based regression discontinuity design (RDD)—a method similar to ours. The study finds that vaccination improved perceptions of the policy itself and of related pandemic measures, such as "Vaccinations are progressing well in your municipality," "School closures are effective in containing COVID-19," and "Emergency financial assistance for low-income households is adequate." Agrawal et al. (2021) uses variation in eligibility ages across U.S. states and an

instrumental variables approach, showing that vaccination reduced mental illness symptoms, as measured by the PHQ scale, by approximately 30%.[1]

Our study provides causal identification of the impact of vaccination policy on political trust. Trust is measured following the widely-used format of the World Values Survey (WVS), a long-standing international standard.[2] Our analysis further adds several key elements that enrich our understanding of the mechanisms linking public policy and political trust.

First, to identify which stage of policy implementation led to increased public trust, we differentiate between trust in the central government (hereafter, central government trust) and trust in the local government (hereafter, local government trust). The literature has discussed how the vertical structure of governments influences policy effectiveness and, in turn, shape various socio-economic outcomes (Besley and Coate, 2003; Bjørnskov, Drehe and Fischer, 2008; Ligthart and van Oudheusden, 2015; Martinez-Vazquez, Lago-Peñas and Sacchi, 2017; Oates, 1999), including trust in government (Ligthart and van Oudheusden, 2015). In the case of COVID-19 vaccination, a vertical structure was widely adopted, with the central government designing the overall plan and local governments responsible for administration.[3] These features suggest that the division of responsibilities between central and local governments—clearly observed in the vaccine rollout—may have shaped how citizens evaluate each level's contribution, leading to heterogeneous effects on trust.

Our study focuses on institutional trust in central and local governments, rather than trust in political parties or individual politicians. In the context of COVID-19, policy compliance was crucial, and institutional trust has been particularly emphasized as a key factor promoting cooperation and pro-social behavior (Barrios et al., 2021; Elgar, Stefaniak and Wohl, 2020; Oksanen et al., 2020; Sternberg, Steinert and Büthe, 2024). By contrast, trust in political parties and individual politicians has been more commonly used as an indicator of political preferences or partisan alignment in the voting context (Cruz et al., 2024; Elinder, Jordahl and Poutvaara, 2015; Kendall, Nannicini and Trebbi, 2015; Labonne, 2013; Zucco, 2013). Badman et al. (2022) demonstrates that compliance with infection-control measures during the pandemic was influenced by trust in institutions, not by trust in individual politicians. Therefore, our analysis concentrates on institutional trust, which is directly relevant to examining the causal link from policy implementation to trust during a public health crisis.

Second, we investigate the underlying mechanisms that increase government trust by focusing on the tangible benefits provided by the vaccination policy. We begin by analyzing its impact on mental health. During the prolonged pandemic, deteriorating mental health became a significant concern, particularly among women (Banks, Fancourt and Xu, 2021; Choi et al., 2020; O'Connor et al., 2021; Sibley et al., 2020). Improved mental health has been shown to correlate with increased government trust and greater compliance with infection control measures (Bernardi and Gotlib, 2023; Taylor, 2022). Thus, receiving the vaccine could enhance mental health in addition to its medical and epidemiological benefits.

To further clarify this mechanism, we conduct a causal mediation analysis (Dippel, Ferrara and Heblich, 2020; Dippel et al., 2022) that explores the pathway between the vaccination priority policy, the expectation of future vaccination, the action of receiving a vaccine, and the resulting trust. This approach enables us to disentangle whether the observed increase in trust is primarily driven by

[1]There are other studies that have examined the mental health benefits of vaccination. For instance, Koltai et al. (2022) employs a difference-in-differences method to demonstrate that vaccination improved mental health by approximately 25% with a particularly significant effect among Indigenous populations. Chaudhuri and Howley (2022) uses a matching method and find that the mental health benefits of COVID-19 vaccination were more pronounced among the elderly and those with high-risk conditions. Additionally, Yamamura et al. (2023) reports a positive correlation between vaccination and improved mental health among Japanese women.

[2]WVS is one of the most used surveys to measure trust attitudes across the world (Ortiz-Ospina, Roser and Arriagada, 2016). It has been conducted over several decades in a large number of countries, including Japan, and is frequently used in studies on trust in government (Besley and Dray, 2024; Elgar, Stefaniak and Wohl, 2020; Ligthart and van Oudheusden, 2015; Ortiz-Ospina, Roser and Arriagada, 2016).

[3]For instance, the U.S. federal government provided states with a COVID-19 vaccination program playbook that clearly delineated the roles of federal and state authorities.

the tangible benefits of vaccination itself, or by the anticipation and commitments associated with policy design and initiation.

Japan's vaccination priority provides a suitable empirical context in which these mechanisms can be disentangled. Following the government's announcement, people understood that everyone would eventually have access, so anticipation of vaccination existed on both sides of the threshold. What distinguished the priority group was their opportunity to act on this anticipation by making earlier reservations and subsequently to realize it. This institutional feature allows us to isolate the effect of realization from anticipation. The causal mediation analysis further exploits the reservation and vaccination stages to identify the respective effects of anticipation and realization. Related studies on cash transfer programs Elinder, Jordahl and Poutvaara (2015); Labonne (2013); Manacorda, Miguel and Vigorito (2011); Zucco (2013), by contrast, typically involve settings where anticipation and realization occur together or not at all, leaving little scope to distinguish anticipation from realization.

By leveraging the features of the priority policy, our study offers a richer understanding of how policies can build public trust. The mediation analysis shows no trust gain specific to the reservation stage—indeed, the estimated effect is weakly negative—and trust rises only after the realization of vaccination benefits. These findings highlight that announcing or initiating a policy is not enough; successful policy delivery that allows individuals to experience its benefits is crucial for increasing trust in government.

Moreover, the finding regarding the reservation stage suggests that the dynamics of trust formation may involve behavioral mechanisms not fully consistent with rational expectations. Under a rational-expectations framework, as individuals move from policy announcement to reservation and eventual vaccination, uncertainty about benefits should decline and expected utility should increase monotonically. However, the observed pattern—where trust fails to rise, and even weakly declines, at the reservation stage—deviates from this prediction. One possible mechanism is reference dependence (O'Donoghue and Sprenger, 2018; Pickard, Dohmen and Van Landeghem, 2024): individuals may evaluate their situation relative to others within the same social group (e.g., other priority recipients) rather than to society at large. Another is salience (Bordalo, Gennaioli and Shleifer, 2022): making a reservation may increase the salience of vaccination benefits while simultaneously heightening awareness of the fact that one remains unvaccinated. In real-world policy settings, priority measures are often publicly announced to both eligible and ineligible groups. In such contexts, raising expectations without promptly delivering tangible benefits can backfire, emphasizing the importance of policy completion that delivers visible and credible outcomes.

3. Research Design

We employ a Fuzzy Regression Discontinuity Design, leveraging the characteristics of Japan's COVID-19 vaccination policy, which uniformly prioritizes individuals aged 65 years and older across all municipalities. Japan's COVID-19 vaccination attitudes are close to the international average: a global survey conducted prior to the rollout reported an average acceptance rate of 71.5% across 19 countries (Lazarus et al., 2021), and in our own baseline survey 76.5% of Japanese elderly respondents expressed willingness to be vaccinated. This suggests that Japan provides an appropriate context for analyzing how the vaccination policy affects public trust.[4]

This section begins with an overview of Japan's policy, highlighting its similarities and differences with those of other countries. We then describe the identification strategy based on Japan's unique

[4]A prominent cross-national study conducted prior to the pandemic reported that vaccine confidence was relatively low in Japan (de Figueiredo et al., 2020). However, Japanese survey responses are known to exhibit a tendency toward middle-category choices (Gordon and Kikuchi, 1970). This cross-national analysis did not account for this response style and instead classified middle responses as indicating a lack of confidence, a coding rule that may have biased the comparison. In reality, vaccine confidence in Japan may be closer to the international average. Supporting this interpretation, another large-scale survey of 30,000 individuals found that, as in our data, a majority of Japanese respondents reported willingness to receive a COVID-19 vaccine (Nomura et al., 2021).

institutional features, followed by details on the survey methodology, data summary, and estimation methods.

3.1. Vaccination Priority Policy for People Aged 65 and Older

Japan's COVID-19 vaccination priority policy exhibited several features similar to those of other countries (see details of international comparison in Mathieu et al. (2021); van Kessel et al. (2023)): (1) central governments were responsible for policy design and formulation, while local governments handled implementation, (2) essential workers and the elderly were prioritized, and (3) vaccinations were provided free of charge. However, the distinctive structural features of Japan's vaccination policy allowed for a unique analysis with precise identification using the Fuzzy RDD. Below, we first discuss public attitudes toward COVID-19 vaccination, as they are crucial for understanding the context in which the policy was implemented. Then, we elaborate on the specific features, such as the roles of policy actors, a consistent and well-scheduled vaccination rollout with a voucher system, clear eligibility criteria, and implementation timeline.

Different Roles of Central and Local Governments.—In Japan, the central and local governments also played distinct roles in the execution of the vaccination policy. The central government was responsible for procuring vaccines from international suppliers, formulating distribution plans, and overseeing nationwide distribution. The central government defined the priority of vaccination coverage as follows: (1) healthcare workers; (2) individuals aged 65 years and older; (3) non-elderly individuals with underlying medical conditions and workers in elderly care facilities; and, (4) others.

Local governments handled on-the-ground implementation, including dispatching vaccination vouchers, securing healthcare workers, and organizing vaccination sites. A noteworthy aspect of Japan's policy was that local governments were basically prohibited from making significant alterations to the central government's plan.

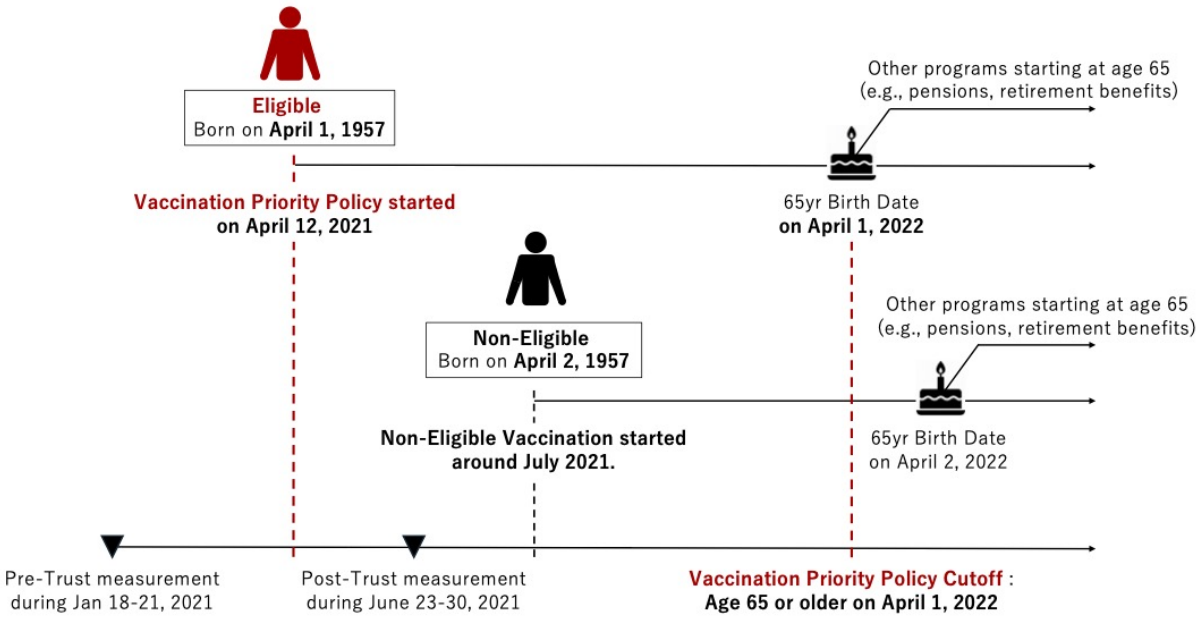
In other countries such as the United States, despite federal guidelines, substantial state-level variations in vaccine policies—including priority age thresholds—led to considerable differences in vaccination rates (Bollyky et al., 2023).[5] In Japan, the strong alignment between central and local governments reduced discrepancies, thereby enabling a more consistent implementation of the vaccination priority policy. This included the uniform application of the age-based priority for those aged 65 and older.

Vaccination Voucher System.—Another unique feature of Japan's policy was its use of a vaccination voucher system. In Japan, individuals could not make a vaccine reservation without a voucher issued by their local government. These vouchers were distributed according to a centrally determined schedule based on age-based priority, enabling a well-controlled and sequential rollout. This system minimized deviations from the eligibility rules and ensured consistent enforcement across municipalities, making the institutional setting highly suitable for a regression discontinuity design. In the United States without a voucher system, some ineligible individuals could receive early vaccination, a practice referred to as "line jumping" (CNN, 2021; Los Angeles Times, 2020; NPR, 2021).

65-Aged Eligibility for Vaccination Priority.—In Japan, the vaccination priority condition of "65 years and older" was applied based on the fiscal year, not the actual date on which individuals turned 65. Specifically, individuals who would reach their 65th birthday by the end of fiscal year 2021 (i.e., April 1, 2022) were eligible for vaccination priority, as shown in Figure 1. As we will explain in Section 3.2, this approach helps establish our identification strategy by excluding the confounding effects of other age-based policies, such as retirement benefits and pensions, which are typically tied to the 65th birthday. In other countries, vaccination priority thresholds were applied

[5] In the United States, these variations may have been driven by citizen political preferences. This situation poses a potential issue: even with lower vaccination rates, trust in state governments among those opposing vaccination might remain relatively high.

based on 65th birthday. Throughout this paper, the term "65 years and older" refers to eligibility based on the fiscal year.



Note: This figure illustrates the institutional setting that supports the exclusion restriction. There is a clear discontinuity of several months between the start of vaccination for the eligible group (April 12, 2021) and the non-eligible group (around July 2021). Our follow-up survey was conducted during this gap (June 23–30, 2021), when most non-eligible individuals had not yet received any vaccination. The figure also indicates that other birth-date-based policies—such as pension eligibility or retirement benefits—do not align with this threshold. Specifically, eligibility for priority vaccination was determined based on the age on April 1, 2022, meaning that even those just eligible were still 64 years old at the time of the survey. Therefore, individuals near the threshold were likely affected only by the vaccination priority policy, supporting the validity of the exclusion restriction.

Figure 1: Eligibility and Survey Timeline for Individuals Around the Threshold

Vaccination Policy Stringency.—In 2021, some U.S. states and European countries not only made vaccination free but also incentivized with financial rewards (Kuznetsova et al., 2022; National Governors Association, 2021). In such cases, it cannot be said that only the vaccination priority policy influenced the government trust. This is because financial rewards may increase the government trust due to reciprocity, while mandatory vaccination against one's will could lead to resistance against the government. In contrast, the Japanese government adopted a policy of recommending vaccination without making it mandatory, leaving the decision to vaccinate up to the individual. This approach allows us to observe the impact of vaccination on government trust in a more unbiased manner.

Implementation Schedule.—We describe the implementation schedule of the vaccination rollout. This priority vaccination for those aged 65 and older began on April 12, 2021. To realize this prioritization, the central government instructed local governments to mail vaccination vouchers to those aged 65 and older around mid-March 2021, and to those under 65 after April 2021. While there were slight variations in the mailing dates among local governments, the prioritization was largely consistent across the country. For example, in Toyonaka City, Osaka Prefecture, vouchers were mailed to those aged 65 and older on March 29, 2021, while those for individuals under 65 were not dispatched until after June 21, 2021.

3.2. Fuzzy RDD Identification Strategy

The structural features of Japan's vaccination priority policy created an empirical setting well suited to identifying the impact of policy realization on trust. Even those outside the eligible group

were guaranteed access to vaccination at a later stage, so both groups shared the same expectation of eventual access. What distinguished the eligible group was their earlier opportunity to act on this anticipation through reservations and, subsequently, to realize it through vaccination. This setting therefore enables us to separate the impact of realization from anticipation on trust in estimation. Related studies on cash transfer programs (Elinder, Jordahl and Poutvaara, 2015; Labonne, 2013; Manacorda, Miguel and Vigorito, 2011; Zucco, 2013), by contrast, typically involve settings where anticipation and realization occur together or not at all, and have not separated the two effects. The vaccination priority policy thus offers a novel empirical context in which these mechanisms can be disentangled.

In fact, the priority policy created a clear discontinuity in first-dose vaccination rates between individuals aged 65 and older and those under 65. By the end of June 2021, according to official statistics (VRS), the vaccination rate among those aged 65 and older had reached 68% (approximately 24.39 million doses administered), while it remained below 5% (approximately 3.5 million doses) among individuals under 65. This distinct difference in vaccination rates creates a natural threshold.

We leverage the discontinuity in vaccination rates around the eligibility cutoff to estimate the causal effect of vaccination on the government trust. Given that the decision to receive the COVID-19 vaccine was left to individuals, non-compliance was observed: some eligible individuals chose not to be vaccinated.[6] To consider this condition, we employ a fuzzy regression discontinuity design (RDD) and estimate the treatment effect among compliers. This approach is analogous to instrumental variable methods (Cattaneo and Titiunik, 2022) and is suited for dealing with partial compliance in observational data (Khanna, 2023; Takaku and Yokoyama, 2021).

A fuzzy RDD must satisfy two key conditions: (1) exclusion restriction and (2) non-manipulation. The exclusion restriction requires that the age threshold of the priority policy affects government trust only through its impact on vaccination status, with no alternative channels. The non-manipulation assumption requires that individuals cannot deliberately control the policy assignment based on the age threshold, ensuring that assignment around the threshold is sufficiently random.

First, we address the exclusion restriction. A common concern when using age thresholds is that turning 65 may coincide with other life events, such as becoming eligible for pensions or retirement benefits. However, this is not the case for Japan's vaccination priority policy. As mentioned in 3.1, although the priority vaccination began on April 12, 2021, eligibility was determined based on whether individuals would turn 65 by April 1, 2022 (the end of fiscal year 2021)—nearly a year later. No other policies or events are known to target this specific threshold. Thus, individuals near the threshold were still 64 years old at the time of vaccination. Moreover, at the time of our survey in June 2021, these individuals were still 64 years and 2 months old,[7] further reducing the likelihood of confounding effects from unrelated policies. These features support the exclusion restriction, as the threshold plausibly affects trust only via vaccination.[8]

Second, we examine the non-manipulation assumption. In this context, the condition is clearly satisfied because individuals were unable to change their birthdate after the vaccination priority policy had been announced. We also conduct a McCrary density test to check this assumption. As shown in Appendix Figure A.1, the test results confirm that there is no evidence of manipulation

[6]There was also some degree of non-compliance among individuals under 65 years of age. As mentioned in Section 3.1, individuals with chronic conditions were permitted to receive the vaccination relatively early. Additionally, in municipalities where vaccinations for the prioritized groups had been completed, others outside these groups were allowed to apply for vaccination with vouchers. However, this issue is minor, as such individuals constitute less than 3% of our analysis sample. To ensure robustness, we conducted a sensitivity analysis by excluding these individuals, and the results remained consistent.

[7]In later figures, we label the threshold as "64yr 2mo" to emphasize that they are still under 65 at the time of the survey, and thus not affected by birth-date-based policies such as pensions.

[8]There is a possibility that even if individuals have not yet received the vaccination, the mere commitment to a vaccination priority policy might increase government trust due to the anticipation that they will soon be able to receive the vaccine. If such an anticipation effect is present, it would imply that the exclusion restriction is not satisfied. In Section 5.1, we empirically check whether there is an increase in trust purely due to this anticipation effect.

around the eligibility cutoff, supporting the validity of our fuzzy RDD approach.

3.3. Panel Data

We originally constructed the analysis dataset for the fuzzy RDD by conducting a five-wave online survey. During the COVID-19 pandemic, researchers widely employed online surveys,[9] primarily due to social distancing measures encouraged by governments to prevent the spread of infection. Under these conditions, large-scale face-to-face or mail surveys became difficult to conduct. In contrast, online surveys offered the advantage of rapid deployment, enabling timely data collection in response to the frequently changing vaccination policy details and schedules. As such, online surveys were both feasible and efficient in this setting. While online surveys are often criticized for issues such as limited representativeness or concerns over response accuracy, we addressed these limitations through careful respondent allocation and multiple follow-up waves, thereby enhancing the reliability of our panel data.

We conducted the first wave (baseline) from January 18 to 22, 2021, targeting 6,266 residents in Japan aged 60 to 74. Shortly after the survey, on January 25, the Japanese government officially announced the vaccination priority policy for individuals aged 65 and older. The priority vaccinations began on April 12. To ensure representativeness, we recruited respondents using quotas based on gender, five-year age groups, and ten geographic regions, in accordance with the Basic Resident Register—the official population register of Japan.

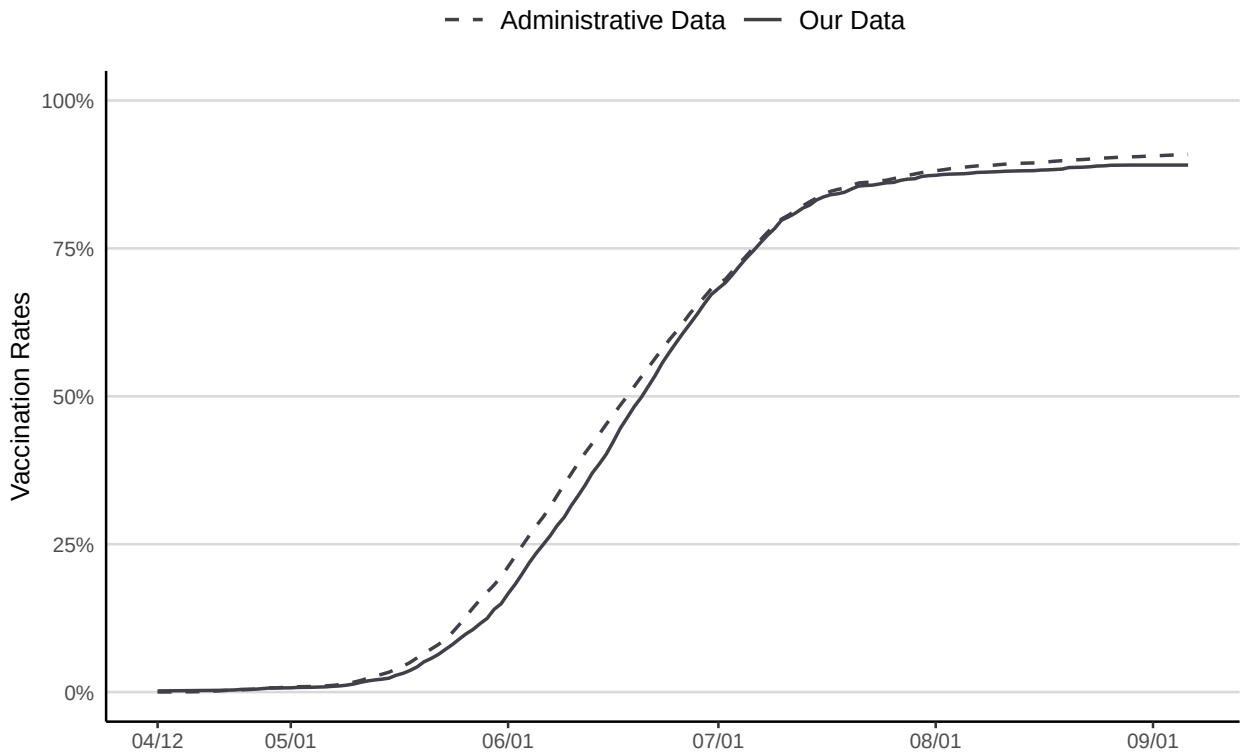
Subsequently, we conducted a total of four follow-up waves (May 21–27, June 23–30, July 21–28, and August 27–September 5, 2021) to monitor whether and when participants received their vaccinations and collect related information. We separately recorded the dates of the first and second doses. A total of 4,019 respondents completed all surveys, resulting in a 64.1% completion rate. To maintain representativeness, we ensured that the proportions of gender, age, and regional distribution in our sample aligned with administrative data in each follow-up wave (see Appendix Table A.1). Thus, any attrition from the baseline survey was unlikely to compromise the representativeness of our sample.

Our analysis focuses on vaccination status in June, when the difference in first-dose vaccination rates around the age 65 threshold was most pronounced. By concentrating on whether individuals received the first dose, we aim to capture a clearer causal effect of the intervention. Our approach addresses a common limitation in previous studies on COVID-19 vaccination, which focus on second dose uptake. This focus may lead to the misclassification of individuals who had already received their first dose as unvaccinated, due to the sole use of second-dose status as the outcome measure. By conducting multiple follow-up waves within a short timeframe, our design allows us to precisely capture first-dose vaccination behavior as it unfolded and thereby enables a more accurate comparison between individuals who had received the first dose and those who had not. Throughout this paper, when we refer to "vaccination," we specifically mean receipt of at least the first dose as identified in the June wave.

Conducting multiple follow-up waves also reduced the risk of measurement errors. By surveying respondents at regular intervals, we could measure trust and mental health metrics relatively close to the timing of vaccination. For instance, a single follow-up survey conducted in September 2021 would have been prone to recall bias for respondents vaccinated in June. Additionally, using trust variables measured in September would have obscured the impact of vaccinations administered in June due to the time lag. This design choice ensured greater temporal alignment between treatment and outcome measures.

As a result of these efforts, our panel data closely reflect real-world trends. Figure 2 compares vaccination rates for individuals aged 65 and older between our panel and the official data. While the official statistics also include those aged 75 and above, the trends for those 65 and older are largely

[9] A back-of-the-envelope search on ScienceDirect.com revealed that from 2016 to 2019, there were 102,635 publications containing the keyword "online survey." From 2020 to 2023, this number increased to 151,028, representing an increase of approximately 50,000 publications. Notably, 36,984 of these publications included the keyword "COVID-19," accounting for around 76% of the increase (as of April 26, 2024).



Note: We obtained the administrative data from VRS. Both of the graphs only show the vaccination rates of those who have the vaccination priority. Administrative data includes all people aged 65 and older, though our survey data covers the age range of 65-74.

Figure 2: Comparison of Vaccination Trends between Administrative Data and Our Data

consistent across the two data sources. To further verify the accuracy of self-reported vaccination dates, we cross-checked them against photographs of official vaccination certificates submitted in January 2022 by a subsample of respondents who had consented to this procedure. The self-reported dates matched the certificates for 89.7% of the subsample (see Appendix B). Even among mismatched responses, the average discrepancy was only 2.25 days (standard deviation of 7.28 days), indicating a high level of accuracy. Based on these findings, we conclude that the vaccination date data obtained from our follow-up surveys are sufficiently accurate for analysis.

3.4. Estimation Model and Variables

This section describes the variables and estimation model used in our analysis. In contrast to prior studies, our approach incorporates several refinements to the estimation strategy and variable construction. First, we measured trust in government using the World Values Survey (WVS) format, distinguishing between trust in central and local governments. This distinction reflects a common feature of political systems—including Japan's—in which the central government typically designs policies, while local governments are responsible for implementation. It is widely acknowledged that trust in central and local governments can differ; during the COVID-19 pandemic, trust in local governments often diverged from that in the central government, tending to be relatively higher (OECD, 2023). Second, to assess mental health, we use the Kessler Psychological Distress Scale (K6) as a secondary outcome variable. Third, leveraging our panel survey data, we conduct a first-difference regression discontinuity (FD-RD) estimation (Lemieux and Milligan, 2008) to analyze changes in outcome variables before and after vaccination, while controlling for time-invariant individual characteristics. This approach also helps mitigate potential reverse causality from trust to vaccination behavior.

Our analysis employs a fuzzy RDD estimation using two-stage regressions. The analysis relies mainly on data collected at two points: the baseline survey conducted in January 2021 and the

follow-up survey in June 2021. The first-stage regression is specified with vaccination as the dependent variable and a running variable defined as age in days, calculated from each respondent's birthdate.

$$\begin{aligned} &\text{First stage:} \\ &Vaccine_i = \alpha_1 + \beta_1 \mathbb{I}\{d_i \geq 0\} + f_{1L}(d_i < 0) + f_{1R}(d_i > 0) + X_i + \epsilon_i \end{aligned} \tag{1}$$

where i denotes the individual respondent. $Vaccine_i$ is a binary variable indicating whether the respondent received at least the first dose of vaccination.[10] d_i is the running variable, defined as the number of days from the fiscal year threshold (April 1, 2022) to the respondent's 65th birthday. When the running variable is 0 or above, individuals are assigned to the eligible group. A key strength of our dataset is the use of a running variable measured in days. As Lee and Card (2008) pointed out, typical RDD applications rely on discrete running variables such as age-in-years or age-in-months due to the lack of precise birthdate information. These discrete variables require additional parametric assumptions, as they do not allow for fine-grained comparisons near the threshold. In contrast, our day-level measure avoids such assumptions and enables more precise identification. $\mathbb{I}\{d_i \geq 0\}$ is an indicator function that takes the value 1 if the respondent is eligible for the priority policy. $f_{1L}(d_i < 0)$ and $f_{1R}(d_i > 0)$ are functions representing the relationship between d_i and vaccination outcomes on the left and right sides of the cutoff, respectively. X_i represents covariates that capture the local vaccination environment and infection status in the respondent's area, which may not be fully captured by the running variable alone. Specifically, it includes the cumulative vaccine supply per capita in the respondent's prefecture, whether a state of emergency or quasi-emergency measures were in effect, and the ease of making vaccination reservations. The details of these variables are listed in Table 1.

The second-stage regression is specified as a reduced form regression to estimate the impact of vaccination on the outcome variable:

$$\begin{aligned} &\text{Second stage:} \\ &Y_i = \alpha_2 + \beta_2 \widehat{Vaccine}_i + f_{2L}(d_i < 0) + f_{2R}(d_i > 0) + X_i + \epsilon_i \end{aligned} \tag{2}$$

where the primary outcome variable Y_i includes the central government trust and the local government trust, measured in a manner consistent with the format of the WVS. We asked the respondents to rate their trust in these institutions on a five-point scale from 1 ("None at all") to 5 ("A great deal"). The secondary outcome variable is mental health, measured using the K6 scale, which assesses mental illness symptoms with six items scored from 0 to 4, totaling 24 points. Following Kessler et al. (2003) and Sakurai et al. (2011), we convert the K6 score into a binary indicator for mental illness symptoms.

In our analysis, the main outcome variable Y_i is the first difference in government trust, measured before and after the implementation of the vaccination priority policy. By taking first differences, we control for individual fixed characteristics and mitigate concerns about reverse causality, thereby isolating the effect of vaccination on changes in trust. This panel-data-based approach offers a significant advantage over previous studies that rely solely on cross-sectional data.

We use non-parametric local polynomial regressions following the approach proposed by Calonico, Cattaneo and Titiunik (2014); Calonico et al. (2017). Consistent with the recommendations of Gelman and Imbens (2019),[11] we adopt linear specifications to avoid the pitfalls of higher-order polynomials. We compute bias-corrected estimator and robust bias-corrected confidence interval as suggested by Calonico, Cattaneo and Titiunik (2014); Calonico et al. (2017). We also apply a triangular kernel to place less weight on observations far from the cutoff, thus reducing variance while limiting the influence of other programs, such as pension. Standard error is clustered at the prefecture level to account for within-prefecture serial correlation.

[10] As a robustness check, we additionally control for second-dose vaccination status to isolate the effect of the first dose.

[11] Gelman and Imbens (2019) identify three main issues with high-order polynomials in RD designs: noisy estimates, sensitivity to the choice of polynomial degree, and poor coverage of confidence intervals.

Table 1: Description of Key Variables

Outcome Variables: Y_i	
Change in government trust (Main Outcome)	We asked respondents, "How much confidence do you have in the following institutions?" They rated their central and local government trust on a scale from 1 ("None at all") to 5 ("A great deal"). We take the difference between the responses from January 2021 (before vaccination started) and June 2021.
Change in mental illness symptoms (Secondary Outcome)	A binary variable indicating whether the respondent had anxiety or depression symptoms (K6 score of 5 or higher) (Kessler et al., 2003; Sakurai et al., 2011). We take the difference between the responses from January 2021 and June 2021.
Treatment Variable: $Vaccine_i$	
Receiving a vaccination	Whether the respondent received the first dose of the COVID-19 vaccine (binary variable).
Running Variable: d_i	
Age-in-days	The number of days from the fiscal year threshold (April 1, 2022) to the respondent's 65th birthday (positive if turned before the threshold).
Covariate Variables: X_i	
Cumulative vaccine supply	Cumulative vaccine supply per capita in the respondent's prefecture of residence.
State of emergency	Whether a state of emergency or semi-emergency measures were in effect in the respondent's prefecture of residence.
Ease of making a reservation	In the final wave (Aug–Sep 2021), we asked vaccinated respondents, "How easy was it to make a reservation for vaccination in your municipality?" (from 1 = "Very difficult" to 5 = "Very easy"). To measure this objectively, we use the municipal average.

When selecting the bandwidth, there is a well-known trade-off between bias and variance (Iizuka and Shigeoka, 2022; Lee and Lemieux, 2010): a wider bandwidth includes more observations, which increases precision but may introduce bias by incorporating observations farther from the threshold. To address this issue, we validate our estimates using three data-driven bandwidths, as reported in Appendix Table A.2. Since the results are robust across these bandwidths, we adopt a bandwidth of three years on either side of the threshold, which is approximately the average of the three. While data-driven bandwidths help eliminate arbitrariness, they have the drawback of varying depending on the outcome variable or sample, which may complicate interpretation. By employing a consistent bandwidth throughout our analysis, we ensure comparability across specifications, even with a relatively small sample size. Within this bandwidth, our estimation sample consists of 1,567 respondents: 834 eligible for priority vaccination and 733 not eligible.

3.5. Validity of the Regression Discontinuity Design

This section assesses the validity of employing a fuzzy regression discontinuity design in our setting. First, we show that the vaccination priority policy generated a substantial discontinuity in vaccination rates at the eligibility threshold. We then examine whether key outcome variables and relevant covariates exhibit continuity around the cutoff prior to the intervention. A central identification assumption of RDD is the continuity of conditional regression functions—that is, in the absence of the intervention, the distribution of potential outcomes should be smooth around the threshold. If this condition holds, any discontinuity in the outcome variable can be attributed to the treatment effect rather than to pre-existing differences.

First, our data reveal that, as of June 2021, the vaccination rate exceeded 52% among individuals eligible for the vaccination priority policy, while it remained at only 6% among those who were ineligible. This sharp contrast indicates a substantial discontinuity at the eligibility threshold. Panel A of Figure 3 presents the first-stage regression results, visually confirming this marked discontinuity.

Second, we assess the continuity of outcome variables and socio-economic characteristics at baseline. Since the priority vaccination program began in April 2021, there should be no discontinuities in the baseline survey conducted in January 2021.[12] For outcome variables, descriptive statistics in Appendix Table C.1 show minimal differences between eligible and ineligible groups. Panels B and C of Figure 3 further visualize this similarity, showing no notable age-related differences in trust or mental health prior to the rollout of priority vaccinations. While Appendix Table C.1 provides an overview of baseline characteristics, some patterns are not immediately conclusive based on descriptive comparisons alone. To more rigorously assess continuity, we conduct formal balance tests in Appendix Table C.2, following the approach of Cattaneo and Titiunik (2022). The results support the continuity assumption at baseline.

[12]The Japanese central government began discussing the vaccination policy in December 2020. However, the eligibility threshold (aged 65 and older) was finalized and officially announced by the Ministry of Health, Labour and Welfare on January 25, 2021. Available at: `https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/vaccine_notifications.html` (accessed November 17, 2024). [in Japanese]

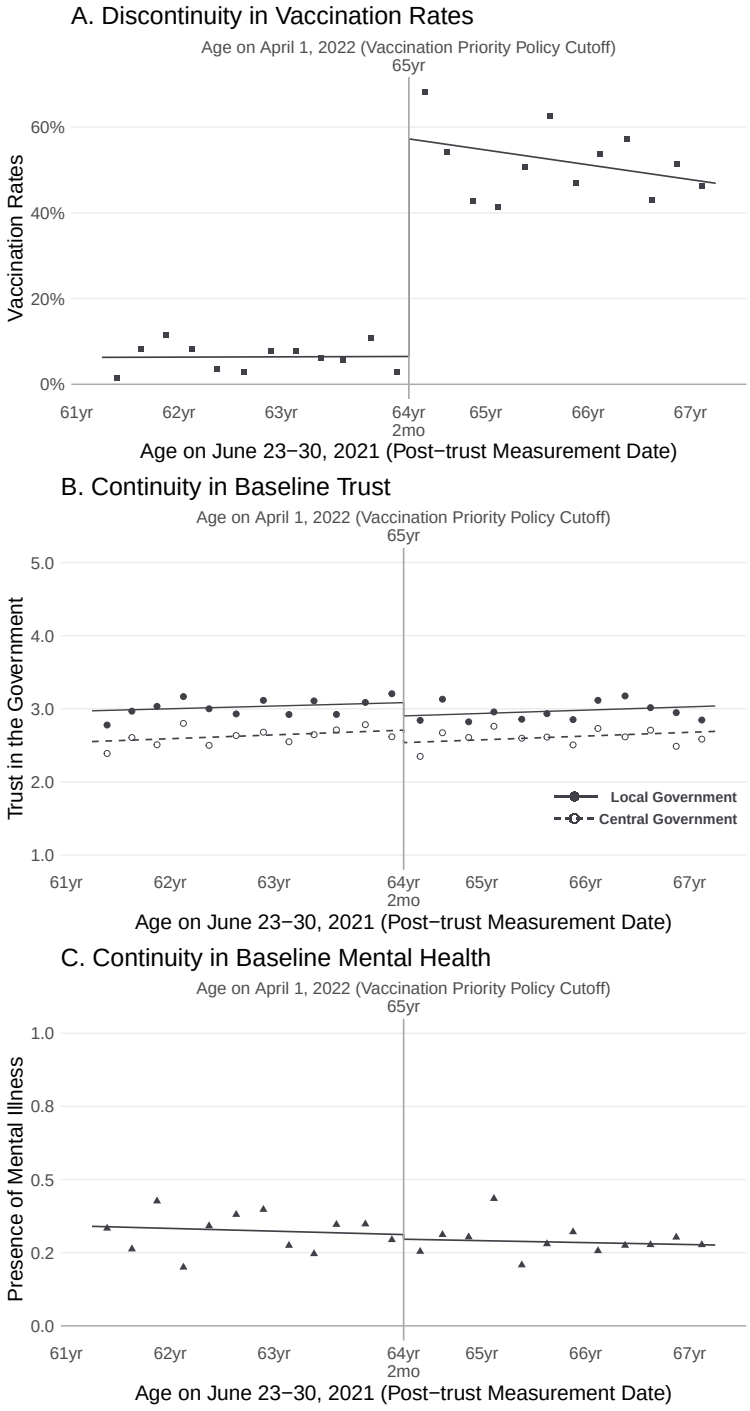


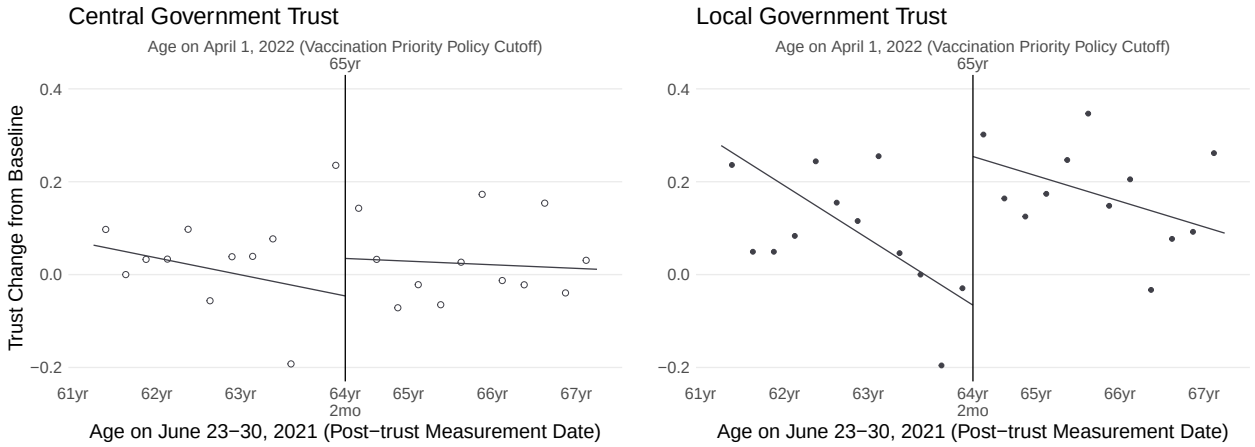
Figure 3: RDD Condition Checks

Note: In this figure, we confirm whether our RDD satisfies conditions. Panel A represents discontinuity of the vaccination rates in June 2021 due to the vaccination priority policy. Panel B and C show continuity of our outcomes measured in January 2021, before the start of the vaccination policy. We measure the government trust on a 5-point scale. We measure symptoms of mental illness using the K6 scale, which we convert into a dummy variable. This dummy variable takes the value of 1 when the K6 score is at least 5, indicating the presence of anxiety or depression. The curves present local linear regression with a triangular kernel.

4. Main Analysis

This section presents the RDD estimates of the effects of the COVID-19 vaccination priority policy on trust in government. Section 4.1 shows that the policy significantly increased trust in local governments but had no detectable effect on trust in the central government. Section 4.2 explores heterogeneity by gender. Given that disparities in economic and health burdens during the COVID-19 pandemic were particularly pronounced between men and women, we find that the increase in trust is concentrated among women—who arguably received greater benefits from the policy. Section 4.3 conducts robustness checks using donut-hole RDDs and placebo tests, confirming that the observed effect is unlikely to be driven by statistical noise.

4.1. Effect of Vaccination Policy on the Government Trust



Note: The vertical axis represents the change in central and local government trust, measured on a 5-point scale, between January 2021 and June 2021, before and after the start of the vaccination campaign. The curves present local linear regression with a triangular kernel. There is no a discontinuity around the threshold for central government trust, which is responsible for policy making. On the other hand, we can find a discontinuity in local government trust, which implemented the policy, with an increase in trust among those prioritized for vaccination.

Figure 4: Discontinuity of the Government Trust by Priority Eligibility

We begin by visually examining discontinuities in government trust around the eligibility threshold. Figure 4 displays the relationship between eligibility for the vaccination priority policy and changes in the central and local government trust from January to June 2021. The left panel indicates no evident shift in central government trust around the cutoff. In contrast, the right panel shows a clear discontinuity at the threshold, with local government trust increasing among individuals eligible for priority vaccination.

Table 2 presents the RD estimation results. Panel A shows the effect of the priority policy on vaccination uptake, indicating a 55.5 percentage point increase in the vaccination rate among the eligible group. Panel B reports the intention-to-treat (ITT) effects of the priority policy on government trust. Column (1) indicates no significant effect on the central government trust, whereas column (2) shows a 0.399-point increase in the local government trust. These estimates align with the discontinuities observed in Figure 4.[13] Panel C presents the local average treatment effect (LATE) estimates of receiving a vaccine under the priority policy. Similar to the ITT results, we find no significant effect on the central government trust. However, column (2) reveals a statistically significant 0.727-point increase in local government trust at the 5% level. This corresponds to a 24.3% increase relative to the baseline average trust score of 2.99.

The results suggest that prompt receipt of the vaccine—resulting from coincidental eligibility for priority vaccination—increased trust in local governments, which were responsible for administering

[13]Slight discrepancies between Table 2 and Figure 4 reflect differences in estimation methods (e.g., bias-corrected non-parametric regressions in the table).

Table 2: Impacts of Vaccination Priority Policy on the Government Trust

	(1)	(2)
	Panel A. First Stage Regression From Priority Policy to Vaccination	
RD Estimate	0.555	0.555
	(0.084)	(0.084)
Observations	1567	1567
	Panel B. Sharp Regression Discontinuity From Priority Policy to:	
	Central Government Trust	Local Government Trust
RD Estimate	0.110	0.399
	(0.171)	(0.129)
Observations	1567	1567
	Panel C. Fuzzy Regression Discontinuity From Vaccination under Priority Policy to:	
	Central Government Trust	Local Government Trust
RD Estimate	0.202	0.727
[LATE]	(0.338)	(0.266)
Observations	1567	1567

Note: Panel A shows effects of priority policy on the vaccination in the eligible group. Panel B shows ITT effects of priority policy on the government trust. Panel B results correspond to the size of the jumps near the threshold in Figure 4. Panel C shows the LATE effects of vaccination under the priority policy on the government trust by a fuzzy RDD. Panel C's estimates are almost equal to the ratio of Panel B and Panel A. This approach is similar to IV methods. Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses.

and implementing the vaccination policy. In contrast, there was no significant change in trust in the central government, which was responsible for policymaking. These results are robust even when controlling for baseline health conditions, which account for individuals who may have received early vaccination due to chronic illnesses, and the presence of family members aged 65 or older, which captures potential spillover effects whereby individuals increased their trust in government because their relatives were prioritized for vaccination. Finally, the results remain similar when controlling for second-dose vaccination status, indicating that the effects on trust are primarily driven by the first dose.

4.2. Gender Heterogeneity

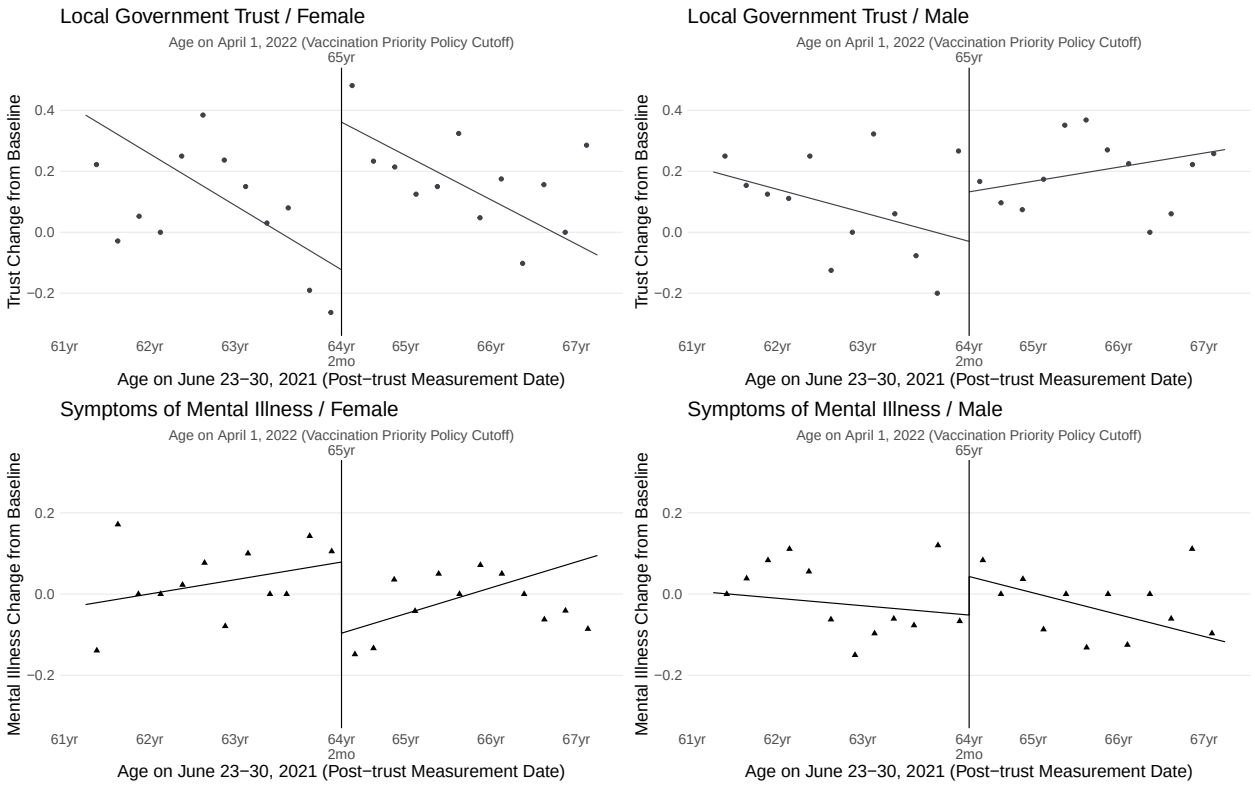
Although our RDD analysis showed that the vaccination priority policy increased public trust, whether this effect reflects the policy's alignment with citizens' expectations remains unclear. To investigate this point, we exploit gender-based disparities in how the pandemic impacted economic and health outcomes. Under the pandemic, women were disproportionately affected, particularly in terms of financial hardship and mental health decline, and the vaccination policy is expected to have delivered greater benefits to women than to men. We therefore extend the earlier analysis by conducting a gender-based subsample analysis. Also, we examine improvements in mental health as a tangible outcome of the policy. Mental health represents one aspect of the pandemic's adverse consequences, whereas its estimated economic value—20,000 U.S. dollars per individual (Cutler and Summers, 2020)—highlights its relevance as a potential channel through which their trust may be enhanced (Bernardi and Gotlib, 2023).

Figure 5 illustrates the relationship between priority eligibility for vaccination and changes in the local government trust and mental health from January to June 2021. The discontinuity around the cutoff is more pronounced for women than for men. The point estimate just below the cutoff (Untreated) appears negative but is not statistically significant. By contrast, the point estimate just above the cutoff (Treated) is positive and statistically significant. OLS regressions of local government trust on Age-in-days also show that the slope is significant only on the right side of the cutoff. These findings suggest that the observed discontinuity reflects an increase in trust among those eligible for the vaccination priority policy rather than a decline among the untreated group.

Table 3 presents the RD estimation results separately for female and male. Panel A shows the effects of the priority policy on vaccination uptake, indicating an increase of 49.8 percentage points in the vaccination rate for women and 61.4 percentage points for men. As in Table 2, Panel B reports the ITT effects of the vaccination policy, and Panel C reports the LATE effects of receiving a vaccine under the priority policy. Columns (1) and (2) present the estimates for local government trust. In Panel C, Column (1) shows that the vaccination policy increased trust among women by 1.609 points ($p < 0.01$), which is more than twice the overall average effect of 0.727 points reported in Section 4.1. In contrast, Column (2) shows almost zero significant effect among men. These results suggest that the increase in local government trust due to vaccination was concentrated among women.

Columns (3) and (4) present the estimation results for mental health, again suggesting a notable impact of vaccination among women. The outcome variable is the change in a binary indicator for states of mental health between the baseline and follow-up surveys. Specifically, it takes the value -1 if symptoms improved, 0 if there was no change, and +1 if symptoms worsened. Column (3) shows that vaccination reduced women's symptoms by 0.683 points ($p < 0.01$), indicating a significant improvement in mental health. In contrast, the effect for men is small (0.100) and statistically insignificant. The pattern, with mental health improvements observed almost exclusively among women, remains consistent even when we vary the cutoff score of the K6 scale from 5 to alternative thresholds (Appendix Table A.3).

In sum, women—whose mental health was more adversely affected during the COVID-19 pandemic—experienced both an increase in local government trust and a reduction in anxiety or depression as a result of receiving the vaccine promptly through priority access.



Note: The vertical axis of the top figure represents the difference in the local government trust, measured on a 5-point scale, between January 2021 and June 2021, before and after the start of the vaccination campaign. We can find a larger discontinuity around the threshold for women on the left side of the figure, indicating an increase in trust among those prioritized for vaccination. The vertical axis of the bottom figure represents the difference in the K6 score between January 2021 and June 2021, with scores of 5 or above classified as indicating presence of mental illness (Sakurai et al., 2011). On the left side, we find the discontinuity around the threshold for women. This indicates a reduction in anxiety or depression among those prioritized for vaccination. The curves present local linear regression with a triangular kernel.

Figure 5: Gender Heterogeneity of the Policy Impacts

Table 3: Gender Heterogeneity in Vaccination Priority Policy Impacts

	(1) Female	(2) Male	(3) Female	(4) Male
	Panel A. First Stage Regression From Priority Policy to Vaccination			
RD Estimate	0.498	0.614	0.498	0.614
	(0.091)	(0.096)	(0.091)	(0.096)
Observations	815	752	815	752
	Panel B. Sharp Regression Discontinuity From Priority Policy to:			
	Local Government Trust		Symptoms of Mental Illness	
RD Estimate	0.790	0.050	-0.334	0.067
	(0.202)	(0.182)	(0.093)	(0.104)
Observations	815	752	815	752
	Panel C. Fuzzy Regression Discontinuity From Vaccination under Priority Policy to:			
	Local Government Trust		Symptoms of Mental Illness	
RD Estimate	1.609	0.049	-0.683	0.100
[LATE]	(0.448)	(0.343)	(0.209)	(0.191)
Observations	815	752	815	752

Note: Panel A shows effects of priority policy on the vaccination in the eligible group. Panel B shows ITT effects of priority policy on the government trust. Panel B results correspond to the size of the jumps near the threshold in Figure 5. Panel C shows the LATE effects of vaccination under the priority policy on the government trust by a fuzzy RDD. Panel C's estimates are almost equal to the ratio of Panel B and Panel A. This approach is similar to IV methods. Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses.

4.3. Robustness Checks

Donut Hole RD.—To assess the robustness of the results, we begin by performing a donut hole regression discontinuity (RD) analysis (Barreca et al., 2011; Cattaneo and Titiunik, 2022). This approach excludes observations close to the cutoff, thereby reducing the influence of potential confounding factors specific to that region, as well as of any outliers. A key rationale is that if RD estimates are highly sensitive to data points near the cutoff, they may raise concerns about robustness. We exclude observations within 30 days before and after the cutoff, which helps mitigate potential concerns: (i) relative age effects stemming from the April start of the Japanese school year (Bedard and Dhuey, 2006; Yamaguchi, Ito and Nakamuro, 2023), and (ii) the salience of April as the policy cutoff, which may have led individuals born in March or April to be especially responsive to the policy.

Columns (1) to (3) in Table 4 show that vaccination increases local government trust even under the donut hole RD specification. This effect remains strong among women, with an estimated increase of 2.297 points, statistically significant at the 1% level. Columns (4) to (6) show similar results for mental health, with vaccination significantly reducing anxiety or depression among women by 0.823 points, also significant at the 1% level.

Table 4: Robustness checks with donut hole RD

	(1) All	(2) Female	(3) Male	(4) All	(5) Female	(6) Male
	From Vaccination under Priority Policy to:					
	Local Government Trust			Symptoms of Mental Illnes		
RD Estimate	1.095	2.297	0.223	-0.311	-0.823	0.078
[LATE]	(0.306)	(0.508)	(0.367)	(0.188)	(0.272)	(0.234)
Observations	1546	805	741	1546	805	741

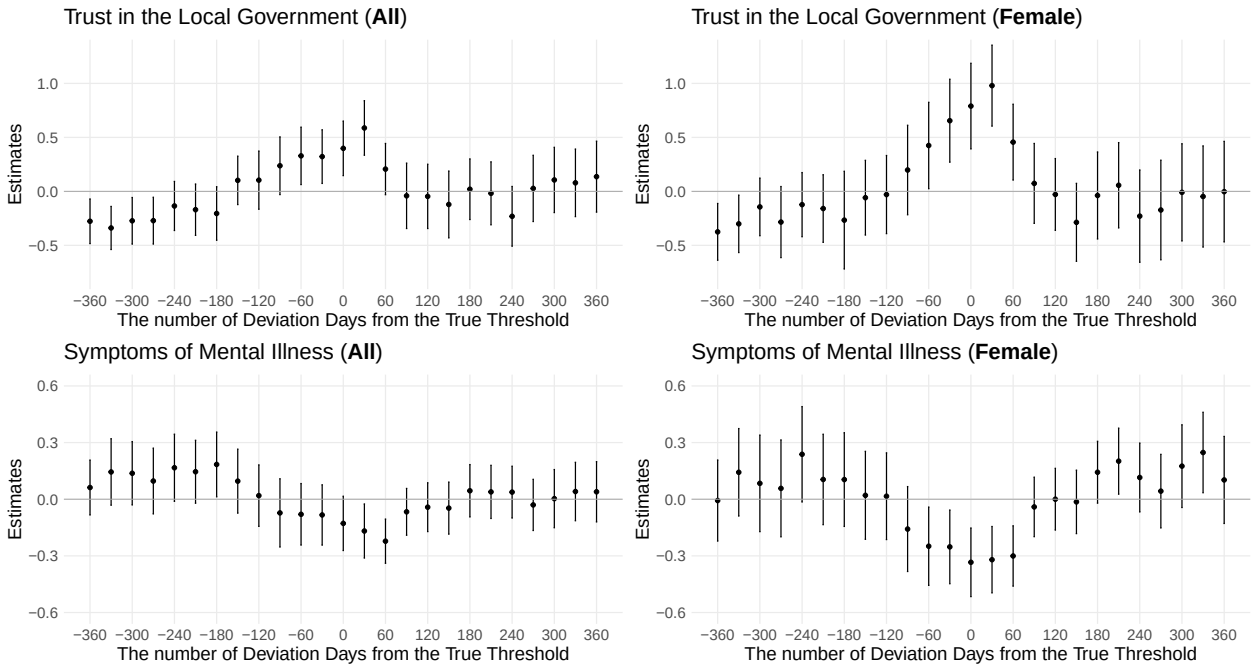
Note: Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses.The results are estimated using donut hole RD (Barreca et al., 2011) which excludes samples within 30 days before and after the threshold.

Placebo Cutoffs.—To further test the validity of our identification strategy, we conduct placebo tests by shifting the cutoff date away from the actual eligibility threshold. Specifically, we move the threshold from the true date of April 1, 1957, to alternative placebo dates ranging from 30 to 360 days before and after the true cutoff (Barreca, Lindo and Waddell, 2016; Cattaneo and Titiunik, 2022). If the estimated effects on local government trust and mental health are truly driven by the vaccination priority policy, we should not observe statistically significant discontinuities at these placebo thresholds.

Figure 6 shows estimated effects on local government trust (top panel) and presence of mental illness (bottom panel) using a series of placebo cutoffs. The observed discontinuities are more pronounced around the true eligibility threshold. The finding reinforces the validity of our RD design and suggests that the detected effects are indeed attributable to the vaccination priority policy.

Does the Increase in Trust Hold? — We already confirmed in Section 4.2 that the apparent decline in female trust to the left side of the threshold (the non-eligible group) was not statistically significant. We therefore interpreted the observed change in trust as stemming from the increase in trust among women prioritized for vaccination.

To assess the robustness of this result, we re-estimate the model reported in Table 3 after imputing zero for the negative trust values observed on the left side of the threshold (see Appendix D). This procedure simulates a counterfactual scenario in which no decline in trust occurs among the non-eligible group. If the increase in trust is still observed under this scenario, it provides stronger evidence that the positive trust effect indeed exists. The results indicate that even with zero imputation applied to samples up to 150 days to the left side of the threshold, the increase



Note: This figure shows placebo tests results using robust confidence intervals and non-parametric local polynomial regressions as proposed by Calonico, Cattaneo and Titiunik (2014); Calonico et al. (2017). In these tests, deviation from the true threshold increases the number of non-compliers, making the first stage estimation unstable. Therefore, unlike previous analyses, we use a sharp regression discontinuity (RD) design instead of a fuzzy RD. The confidence intervals represent the 95% confidence interval.

Figure 6: Placebo Tests

in trust remains robust, with the estimated effect size retaining more than half of its original magnitude.

5. Mechanism: Anticipation or Realization?

We further examine the mechanisms through which the vaccination priority policy increased trust. Our earlier results showed that trust increased in local governments, which implemented the policy, rather than in the central government, which designed it, and that this effect was more pronounced among women, who likely received greater benefits. Together, these findings suggest that the increase in trust is linked to receiving tangible benefits from the policy rather than to mere anticipation. In other words, anticipation of policy benefits alone appears insufficient to raise trust; their realization plays a crucial role.

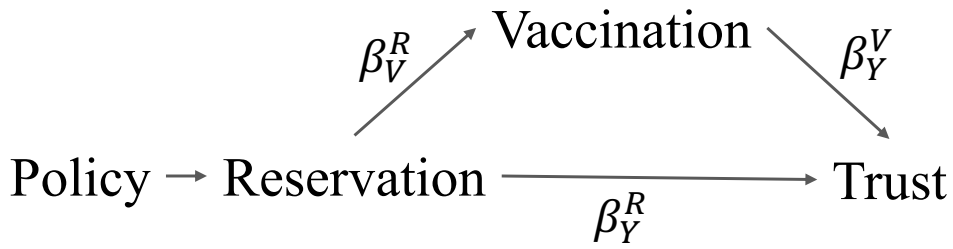
From a policy perspective, identifying which aspects of implementation strengthen trust is critical. If anticipation alone were sufficient, governments might be tempted to exploit this effect without fully implementing the policy. Incomplete implementation would ultimately fail to deliver tangible benefits to the public.

5.1. Mediation Analysis

To investigate the underlying mechanism, we conduct a mediation analysis that decomposes the policy's effect into two distinct channels: anticipation of benefits and realization of those benefits. Specifically, we separate the effect of making a reservation—which serves as a proxy for anticipation—from the effect of actually receiving the vaccine, which represents the realization of the policy's intended benefits. This distinction is also relevant to the identification strategy in our RDD framework. As discussed in Section 3.2, our baseline analysis assumes that the vaccination priority policy influences trust in government solely through actual vaccination. However, being designated as a priority group could also raise trust by creating an expectation of imminent vaccination, even before the vaccine is received. If such an anticipation effect exists, the exclusion restriction would

be violated, and the estimated policy effect on trust would capture both realization and anticipation components.

We examine the anticipation path by focusing on the vaccine reservation process as the initiation phase, during which individuals are merely granted priority status. The reservation process, which is administered by local governments, may generate anticipation and thereby influence trust in them. Our goal is to assess whether trust is more effectively strengthened by the anticipation created through reservation or by the tangible benefits of actual vaccination. Figure 7 depicts the causal relationships among the vaccination priority policy, making a reservation, receiving a vaccine, and trust in local government. Eligibility to make a reservation is determined by the priority policy. In Section 4, we assumed that the reservation process has no direct effect on trust. However, if the direct effect of reservation, β_Y^R, is positive and statistically significant, this would suggest that policy initiation can enhance government trust even before full implementation.



Note: This figure shows causal relationships among the vaccination policy, making reservation, receiving vaccination, and the local government trust. Both reservation and vaccination depend on the priority policy. If the direct effect of reservation β_Y^R is positive and significant, it implies that policy initiation could enhance the government trust even before full implementation.

Figure 7: Mediation Path Diagram

To verify the causal relationships depicted in Figure 7, we conduct a causal mediation analysis following the methodology of Dippel, Ferrara and Heblich (2020). This approach integrates instrumental variables into the mediation framework (Baron and Kenny, 1986) to address the endogeneity of both the running variable and the mediator, thereby relaxing the identification requirements. In our setting, the treatment variable is making a vaccination reservation R, the mediator is actually receiving the vaccination V, and the outcome is trust in the local government Y. Priority vaccination status Z serves as the instrumental variable. We estimate the direct effect of R on Y and the indirect effect operating through V.[14] As before, local government trust Y is measured as the first difference from the baseline survey conducted in January. To keep the setting comparable to the RDD analysis, we restrict the sample to respondents born within one year before or after the threshold.

[14]The estimation is conducted by combining two-stage least squares (2SLS) as follows:

$$\begin{aligned} \text{First stage: } & R = \gamma_R^Z Z + X + \epsilon_R \\ \text{Second stage: } & V = \beta_V^R \hat{R} + X + \epsilon_V \\ \text{First stage: } & V = \gamma_V^Z Z + \gamma_V^R \hat{R} + X + \epsilon_V \\ \text{Second stage: } & Y = \beta_Y^V \hat{V} + \beta_Y^R \hat{R} + X + \epsilon_Y \end{aligned} \tag{3}$$

The identification condition is that $\epsilon_R \perp \epsilon_Y | \epsilon_V, X$, meaning there are no unobserved confounding factors that independently influence both the reservation variable and trust, and are independent of the vaccination variable or covariates. As far as the author can determine, there are no variables that are independent of vaccination but influence the reservation variable (for example, it is unlikely that a variable indicating willingness to vaccinate would not correlate with receiving the vaccination). However, in the context of this study, some respondents might have been able to make a reservation but were unable to receive the vaccination due to the variation of local vaccination infrastructure. These respondents are correlated with the reservation variable but not with the vaccination. To address this, we include prefecture fixed effects in X.

Table 5 presents the results of the causal mediation analysis for trust in the local government. We denote the direct effect of making a reservation as DE, the indirect effect operating through vaccination as IE, and the total effect as TE (TE = DE + IE). Column (1) shows that DE is not statistically significant. By contrast, IE is positive and statistically significant at the 5% level, with an effect size of 0.786. A statistical test further confirms that the IE (0.786) is larger than the DE (-0.323; $p = 0.068$), albeit at the 10% significance level.

Table 5: Identification Using Causal Mediation Analysis

	(1) All	(2) Female	(3) Male
		From Reservation to: Local Government Trust	
Total Effect (TE)	0.463	0.684	0.244
	(0.137)	(0.219)	(0.163)
Direct Effect (DE)	-0.323	-0.925	0.322
β_Y^R	(0.254)	(0.525)	(0.296)
Indirect Effect (IE)	0.786	1.610	-0.078
$\beta_V^R \times \beta_Y^R$	(0.366)	(0.780)	(0.400)
Observations	423	207	216
H_0: IE = DE	0.068	0.047	0.558

Note: Standard errors are reported in parentheses. We report causal mediation estimators by Dippel, Ferrara and Heblich (2020). "H_0: IE = DE" reports the p-value for the test of the null hypothesis that the indirect effect equals the direct effect.

Columns (2) and (3) reveal a gender gap: only among female respondents, the indirect effect is positive and statistically significant (1.610; $p < 0.05$), whereas the direct effect is weakly negative (-0.925; $p < 0.10$). The difference between the two effects is statistically significant at the 5% level. The magnitudes of the indirect effects (0.786 overall; 1.610 for females) are remarkably similar to the corresponding estimates from the main RDD analysis (0.727 and 1.609, respectively), providing evidence consistent with the validity of the mediation analysis results.

These results indicate that making a reservation for vaccination does not directly increase trust in local government; rather, it increases trust indirectly through the actual receipt of the vaccination. In other words, merely being prioritized for vaccination has no direct positive effect on trust—trust rises only after individuals experience the tangible benefits of the policy. Interestingly, the pattern is non-linear among female compliers: compared with those without a reservation, trust may drop once a reservation is made but increases again after vaccination is received.

5.2. Medical Institution Trust

We investigate whether the observed increase in trust in local governments is genuinely attributable to their role in implementing the policy. This "realization" effect may reflect both local governments' role in preparing individuals for vaccination and the actual injection administered by medical professionals. If the latter plays a central role, the increase may reflect trust in the medical institutions that administered the vaccines under local government coordination, rather than trust in the local governments themselves. If trust in medical institutions were to increase, it would provide support for a mere exposure mechanism (Van de Walle and Bouckaert, 2003). To assess these possibilities, we examine whether trust in medical institutions also increased as a result of the vaccination rollout, using the same measurement approach as for local government trust.

Table 6 presents the fuzzy RDD estimation results for the effect of vaccination on trust in medical institutions. In column (1), the estimated coefficient is -0.036, which is small, slightly negative, and not statistically significant. Columns (2) and (3) also show no causal effect, including among women. These results indicate that the vaccination policy did not increase trust in either the central government or medical institutions; rather, it increased trust only in local governments.

This pattern suggests that people evaluate the effective implementation of the vaccination policy, rather than its planning, the physical act of vaccination, or a mere exposure mechanism.

Table 6: Impacts of Vaccination Policy on Medical Institution Trust

	(1) All	(2) Female	(3) Male
	From Vaccination under Priority Policy to: Medical Institution Trust		
RD Estimate	-0.036	-0.201	0.085
[LATE]	(0.358)	(0.436)	(0.472)
Observations	1567	815	752

Note: Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses.

6. Interpretations

This section interprets and discusses our findings. Our fuzzy RDD analysis reveals that the vaccination policy increased trust exclusively in local governments, which were responsible for implementing the policy. In contrast, trust in the central government and medical institutions remained unchanged, despite their respective roles in planning and administering the vaccinations.

A potential explanation for the observed increase in local government trust could relate to the vertical structure between central and local governments. One possible mechanism is that decentralization enhances trust by enabling more effective policy implementation (Ligthart and van Oudheusden, 2015; Martinez-Vazquez, Lago-Peñas and Sacchi, 2017; Oates, 1999). Another mechanism, as discussed in Van de Walle and Bouckaert (2003), is that frequent interactions with local governments may foster trust, consistent with a mere exposure mechanism. Our analysis, however, shows that trust increased only for local governments—and not for medical institutions with direct contact with citizens—suggesting support for the former mechanism.

This increase in trust concerns institutions rather than individual politicians or the policy itself (Fong, 2001; Healy, Persson and Snowberg, 2017; Manacorda, Miguel and Vigorito, 2011). If trust in the central government had increased, we would have found it difficult to distinguish whether this reflected attitudes toward particular politicians, the policy, or the institution. In fact, the rise appeared only for local governments, which neither introduced the policy nor embodied political figures. The finding indicates that the increase captured institutional trust in local governments as implementing agencies.

To isolate the impact of actual policy implementation, we conducted a mediation analysis focusing on the anticipation effect generated during the reservation stage, which we treat as the initiation phase of the vaccination campaign. The results show that merely offering a reservation did not enhance trust in local governments; rather, trust increased only after people received the vaccine. This indicates that citizens evaluate government policies based on realized benefits rather than mere promises.

Our analysis also highlights the significance of implementation from the perspectives of mental health and gender disparities. The increase in trust in local governments was particularly pronounced among women, who experienced significant mental health challenges during the pandemic. The findings indicate that trust improved, and women's mental health also showed marked improvement following vaccination. Additionally, Table A.4 shows a decrease in the subjective probability of severe COVID-19 among women after vaccination, suggesting that the tangible benefits of policy implementation are crucial for building trust.

To gauge the significance of our findings, we compare them with existing studies on the effects of vaccination policies on public perceptions. For instance, Takaku et al. (2025) reported that responses to questions such as "Vaccinations are progressing well across the country" did not change

significantly with priority vaccination. However, positive responses increased for similar statements about the local government. Although they examined changes in perceptions of vaccination progress using policy-specific survey items, the novelty of our study lies in revealing this difference using a general indicator of trust. This allows us to move beyond citizens' perceptions of policy progress to establish how actual policy implementation shapes trust in government. Our results highlight differences in how trust is formed between central and local governments, suggesting that citizens viewed the vaccination priority policy as appropriate and consequently increased their trust in local governments. Although it seems intuitive that policy implementation influences public evaluations, systematic causal evidence on this relationship has been scarce. Our study contributes to this literature by providing rare causal evidence on the link from policy implementation to trust.

In terms of effect size, our analysis shows that the standardized impact of vaccination on trust in local governments is 0.40. By contrast, the previous study reported smaller effects, typically in the range of 0.21 to 0.23. As detailed in Appendix E, their analysis focused on individuals who had completed the second vaccination, which may have led to an underestimation of the impact. Because many individuals who did not complete the second dose had received only the first, it is challenging to isolate the effect of vaccination by analyzing only those who completed the second dose. Using our data, we also confirm in Appendix Table E.1 that the effect of the second dose on trust is indeed smaller, particularly among women.

Of course, our study's findings are subject to certain limitations, particularly regarding generalizability. The estimates reflect the local average treatment effect identified through a regression discontinuity design, capturing the effect on elderly individuals near the threshold who complied with the vaccination priority policy. Consequently, external validity beyond this group remains an open question. Since elderly people are typically the primary target group in infectious disease policies, the very fact that we find a causal effect for this group carries significant implications for infectious disease policy more broadly. Moreover, given evidence of potential mental health benefits from vaccination among younger cohorts (Agrawal et al., 2021), it is plausible that increased trust could also extend to other generations.

Our findings indicate that, beyond its medical and epidemiological benefits, vaccination has fostered public trust in government and improved mental health. This highlights the importance of vaccination not only as a public health measure but also as a socioeconomic policy. There has been evidence of a positive correlation between government trust and economic growth (Knack and Keefer, 1997). Additionally, increased government trust can potentially facilitate economic recovery in times of crisis (Demirgüç-Kunt, Lokshin and Torre, 2021), implying that the increase in trust from vaccination may contribute to broader economic recovery.

7. Conclusion and Policy Implications

In conclusion, this section broadens the scope beyond the specific context of COVID-19 vaccination policy to highlight the general contributions of our study and to discuss its policy implications. Past literature (Algan and Cahuc, 2013; Besley and Dray, 2024; Elgar, Stefaniak and Wohl, 2020; Knack and Keefer, 1997; Putnam, 1993) has shown that a high level of trust in government is associated with higher policy performance and economic development, and that high trust in government has led citizens to voluntarily comply with policies, thereby enhancing their effectiveness. Contributing to this literature, our study provides causal evidence—in contrast to prior work—that implementing effective policy during a crisis can substantially increase citizens' trust in government. Moreover, by exploiting a quasi-experimental design, we help address issues about bidirectional causality—that trust and policy mutually influence each other—which has long been discussed in the literature (Hetherington, 1998).

Our analysis suggests that trust is not merely an exogenous factor but is shaped by how policies are implemented, providing a strong incentive for governments and politicians to pursue effective policies. In the political economy literature, considerable attention has been paid to the role of promises and their fulfillment in shaping voter support. Politicians have incentives to make superficial or populist promises to win elections (Acemoglu, Egorov and Sonin, 2013; Bernhardt, Krasa and

Shadmehr, 2022; Rodrik, 2018), while fulfilling such promises can serve as a strategy for reelection (Alesina, 1988; Harrington, 1993). Besley and Dray (2024) further propose a model in which even policymakers with no intrinsic motivation to maximize social welfare are incentivized to implement appropriate policies through the prospect of reelection. However, because voters' decisions are influenced by multiple policy issues and party affiliations, few studies have successfully identified the causal effect of promises or their fulfillment on electoral outcomes. More recently, studies using natural experiments and randomized controlled trials (RCTs) have begun to address this challenge (Cruz et al., 2024; Ganslmeier, 2025). Cruz et al. (2024) show in an RCT that when voters are informed about a candidate's policy promises, they are more likely to support candidates whose positions align with their preferences, and even more so when they perceive that past promises were fulfilled. These findings capture voter responses based on expectations about future policy fulfillment. However, they do not address whether voters have actually experienced the tangible benefits of fulfilled policies, as opposed to merely anticipating their fulfillment.

In our setting, we employ causal mediation analysis to examine a setting in which the vaccination priority policy was already underway, while individuals' actual access to vaccination varied. This design allows us to isolate the effect of experiencing tangible policy benefits from the effect of expectations. Thus, our analysis differs structurally from previous studies. We show that building political trust requires not only policy initiation (promising) but also fulfillment through the provision of concrete benefits to individuals. This implies that rhetorical promises alone cannot foster public trust, and policy follow-through is critical. The short-lived nature of administrations that fail to deliver on campaign pledges is seen as a real-world reflection of this phenomenon. Accumulating evidence of this kind—that how policies are carried out influences trust—can help mitigate aspects of the principal-agent problem between governments and citizens.

Furthermore, our findings from the reservation stage indicate that the process of trust formation may reflect behavioral mechanisms that depart from rational-expectations reasoning. In a purely rational framework, one would expect that as individuals progress from the announcement of a policy to making a reservation and ultimately receiving vaccination, uncertainty about its benefits would steadily diminish and expected utility would rise. Contrary to this logic, we observe that trust does not increase—and may even slightly fall—during the reservation phase. This pattern can be understood through behavioral mechanisms such as reference dependence (O'Donoghue and Sprenger, 2018; Pickard, Dohmen and Van Landeghem, 2024), where individuals judge their circumstances relative to others in the same priority group, or salience (Bordalo, Gennaioli and Shleifer, 2022), where making a reservation accentuates awareness of vaccination benefits but also of one's still-unvaccinated status. In practical policy contexts, priority schemes are often announced publicly to both eligible and ineligible citizens. When such announcements elevate expectations without the timely delivery of real benefits, they risk eroding trust, underscoring the necessity of completing policies in ways that yield concrete and credible outcomes.

In addition, trust could be enhanced when policies provide benefits through either self-interest or public-interest channels, but our findings suggest that the observed increase operated mainly through the self-interest channel. Public-interest effects of the vaccination policy arose on both sides of the threshold. Our design also controls for these effects by taking first differences before and after policy implementation. Hence, the public-interest effects would not generate a discontinuity at the cutoff. Accordingly, our empirical results indicate that the increase in trust primarily reflected the receipt of self-interest benefits. While prior studies have examined such mechanisms in the context of support for specific politicians or parties, or preference for policy itself (Fong, 2001; Healy, Persson and Snowberg, 2017; Manacorda, Miguel and Vigorito, 2011), our study contributes new evidence by focusing on institutional trust. The presence of a self-interest channel has important policy implications for ensuring the smooth functioning of society: governments can secure the trust of citizens who do not act on the basis of social welfare, thereby increasing their cooperation and compliance with government measures. At the same time, however, this mechanism may incentivize governments to adopt myopic or populist strategies (Acemoglu, Egorov and Sonin, 2013; Bernhardt, Krasa and Shadmehr, 2022; Manacorda, Miguel and Vigorito, 2011; Rodrik, 2018) to gain their

support. Whether the self-interest channel ultimately enhances social welfare remains an important open question for future research.

While our analysis focuses on COVID-19 vaccination policy, its insights may extend to other domains such as disaster preparedness, social support, and infrastructure development. In all of these areas, well-designed, properly implemented, and completed policies may increase trust in government. Future research should explore a broader range of policy areas and demographic groups to identify generalizable mechanisms of trust formation.

Our study contributes by providing empirical evidence for a causal path from policy to trust, in contrast to the commonly observed direction where trust promotes policy support. However, the relationship between trust and policy is not one-directional or static, but rather a dynamic process involving continuous and mutual influence over time. Trust can enhance policy effectiveness, which in turn can foster greater trust. As our findings point to the causal effect of policy on trust, and prior research suggests the reverse, these findings together highlight the possibility of a virtuous cycle between the two. Future research should aim to identify these dynamic mechanisms, in order to better understand how governments can foster trust while maximizing the long-term impact of their policies.

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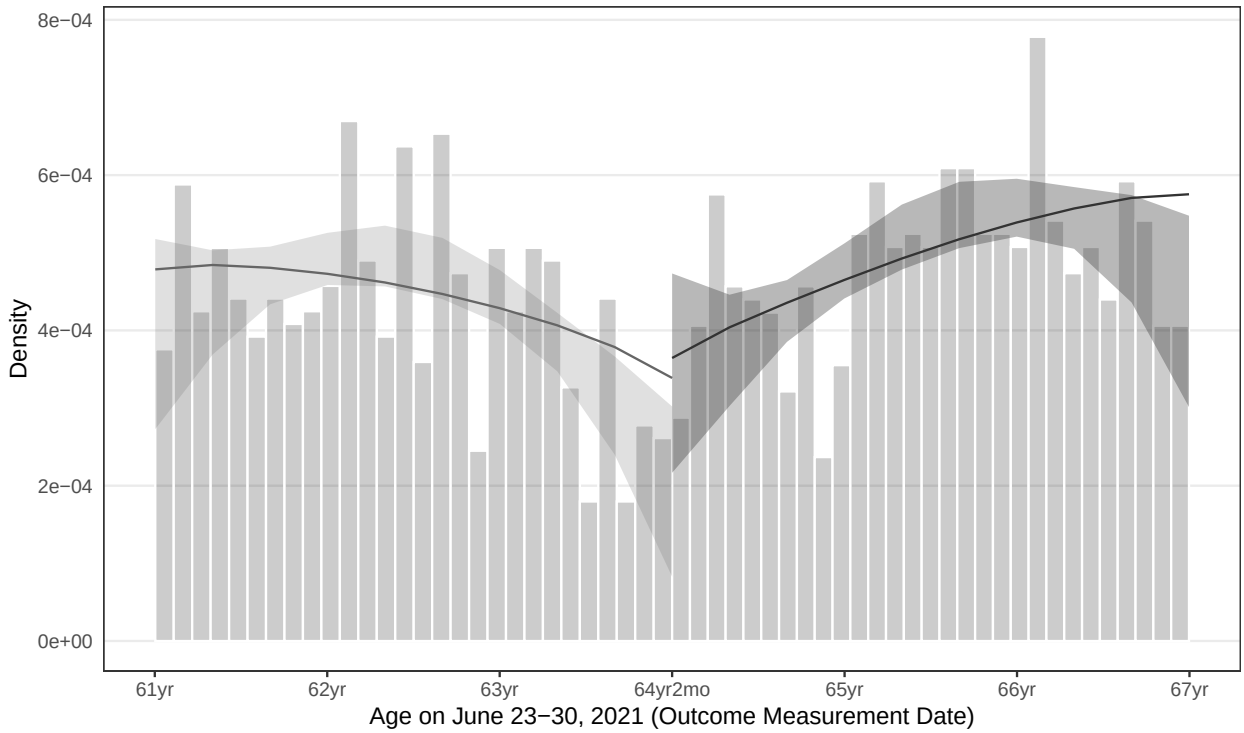
Appendix

From Policy to Trust: A Regression Discontinuity Analysis

By Hidetoki Nakayama, Shusaku Sasaki, Tomoya Saito, and Fumio Ohtake

Contents

Appendix A. Appendix A. Supplementary Figures and Tables



Note: The figure shows McCrary density test of running variable, i.e. age-in-days. The 95% confidence intervals show continuity of the density around the threshold of the priority policy (born on or before April 1, 1957). Therefore, there is non-manipulation.

Figure A.1: McCrary Density Test of Running Variable

Table A.1: A Comparison in Regional Distribution between Survey Respondents and Administrative Data

	60-64 yr		65-69 yr		70-74 yr	
Region	Survey (N=1,254)	Admin (N=7,490,400)	Survey (N=1,416)	Admin (N=9,096,371)	Survey (N=1,349)	Admin (N=8,201,584)
Hokkaido	4.1%	4.7%	4.6%	4.9%	5.0%	4.5%
Tohoku	7.3%	8.5%	7.4%	8.1%	6.0%	7.0%
Northern Kanto	8.0%	8.3%	7.7%	8.3%	7.4%	8.0%
Southern Kanto	27.8%	25.4%	27.9%	25.2%	29.5%	26.7%
Hokuriku	4.2%	4.5%	3.6%	4.5%	4.7%	4.4%
Chubu	12.5%	11.3%	11.7%	11.4%	12.3%	11.9%
Kansai	15.1%	15.1%	16.5%	15.7%	16.4%	16.8%
Chugoku	6.3%	6.0%	5.9%	6.2%	5.4%	6.3%
Shikoku	3.0%	3.4%	3.0%	3.4%	3.0%	3.4%
Kyushu/Okinawa	11.8%	12.8%	11.7%	12.3%	10.3%	10.9%
Chi-squared test	$p = 0.40$		$p = 0.30$		$p = 0.31$	

Note: This table summarizes the distribution between our survey respondents (N=4,019) and the administrative data. Data is classified by five-year age groups, consistent with the classification of the administrative data. The chi-squared test evaluates the goodness-of-fit between the survey respondents and the administrative data, indicating no significant differences.

Table A.2: Impacts of Vaccination Policy on Local Government Trust with Various Bandwidth

	CCT Bandwidth			IK Bandwidth			Cross Validation Bandwidth		
	(1) All	(2) Female	(3) Male	(4) All	(5) Female	(6) Male	(7) All	(8) Female	(9) Male
	Panel A. First Stage Regression From Priority Policy to Vaccination								
RD Estimate	0.599	0.570	0.708	0.565	0.600	0.595	0.534	0.576	0.585
	(0.092)	(0.104)	(0.108)	(0.087)	(0.106)	(0.088)	(0.073)	(0.102)	(0.084)
Observations	903	394	264	1266	714	1119	2010	611	945
Bandwidth	667.820	598.164	436.635	892.043	967.766	1916.611	1388.000	852.800	1388.000
	Panel B. From Vaccination under Priority Policy to: Local Government Trust								
RD Estimate [LATE]	0.632	1.430	0.027	0.700	1.410	0.138	0.785	1.443	0.158
	(0.298)	(0.567)	(0.355)	(0.284)	(0.631)	(0.348)	(0.236)	(0.610)	(0.325)
Observations	903	394	264	1266	714	1119	2010	611	945
Bandwidth	667.820	598.164	436.635	892.043	967.766	1916.611	1388.000	852.800	1388.000

Note: The table show vaccination policy impacts on local government trust with three different bandwidths. Robust bias-corrected standard errors, clustered at the prefecture level, are reported in parentheses. The bandwidths in columns (1)-(3), (4)-(6), and (7)-(9) are selected using methods proposed by Calonico, Cattaneo and Titiunik (2015), Imbens and Kalyanaraman (2012), and Ludwig and Miller (2007), respectively. All bandwidths are computed using the Rdrobust package (See Calonico et al. (2023)). Our IK and cross-validation bandwidths are not entirely precise due to the selector function being available only for sharp RD designs. However, this is a minor issue since we use these bandwidths as robustness checks for different bandwidths. We find that the results across various bandwidths are consistent with our main results.

Table A.3: Results of Other Cutoffs of K6

	(1) ALL	(2) Female	(3) Male
4/5 cutoff (Sakurai et al., 2011)			
RD Estimate	-0.245	-0.683	0.100
[LATE]	(0.148)	(0.209)	(0.191)
9/10 cutoff (Comprehensive Survey of Living Conditions in Japan)			
RD Estimate	-0.092	-0.433	0.155
[LATE]	(0.117)	(0.174)	(0.175)
12/13 cutoff (Kessler et al., 2003)			
RD Estimate	-0.275	-0.354	-0.212
[LATE]	(0.118)	(0.170)	(0.153)
K6 at 24-point scale (Kessler et al., 2002)			
RD Estimate	-2.422	-6.264	0.403
[LATE]	(1.413)	(1.926)	(1.838)
Observations	1546	805	741

Note: This table shows the results when we change the K6 cutoff which represents symptoms of mental illness. The first row shows same cutoff results in Table 3. Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses. Each results shows vaccination policy reducing mental illness among women.

Table A.4: Impacts on the Subjective Probability of COVID-19 Severity

	(1) All	(2) Female	(3) Male
	Panel A. First Stage Regression From Priority Policy to Vaccination		
RD Estimate	0.555	0.498	0.614
[LATE]	(0.084)	(0.091)	(0.096)
Observations	1567	815	752
	Panel B. From Vaccination under Priority Policy to: the Subjective Probability of COVID-19 Severity		
RD Estimate	-0.798	-1.633	0.081
[LATE]	(0.640)	(0.784)	(0.947)
Observations	1567	815	752

Note: Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses.The outcome variable is the logarithmic transformation of the subjective probability of COVID-19 severity, derived from the question, "If you were to contract COVID-19 in the future, what do you think is the likelihood that you would develop severe symptoms and have lasting severe aftereffects?" The difference in this transformed value is calculated between January 2021 and June 2021, before and after the start of the vaccination campaign.

Appendix B. Appendix B. Verification of Vaccination Dates Accuracy

To directly verify the accuracy of vaccination history data, we requested 117 elderly individuals who consented to cooperate to submit photographic data of their vaccination records, and compared the records in the photographs with their self-reported responses.[15] Among the elderly, the records in the photographs completely matched the self-reported responses for 102 out of 117 individuals. For the unmatched responses, the average discrepancy with the photographic data was 2.25 days (standard deviation 7.28 days). To account for selection bias due to vaccination intention, we asked the survey company to ensure that the respondents submitting photographic data had varying levels of vaccination intention as of the January survey. We confirmed that there is no statistically significant relationship between the rate of matching responses and prior vaccination intention.

[15]For review and approval to conduct the photo survey, we submitted a separate application to the Ethics Committee of the Graduate School of Economics, Osaka University. For the photographic survey, we requested participants to take and upload photos showing only the parts of the vaccination record that included the "date of vaccination," "type of vaccine," "lot number," and "vaccination site." We confirmed in advance that this information does not qualify as personal information. For example, we inquired with Takeda Pharmaceutical's "COVID-19 Vaccine Moderna Dedicated Line" regarding the lot number and received a response that "the lot number is related to the manufacturing batch and does not identify individuals." When requesting participants to take and upload the photos, we provided clear instructions on how to avoid capturing personal information. In the event that personal information was inadvertently included in the photos, the contracted survey company appropriately handled it to ensure that such information was not provided to the researchers.

Appendix C. Appendix C. Pre-intervention Continuity of Outcome variables and Socio-economic characteristics

Table C.1 shows the descriptive statistics. In addition to overall descriptive statistics, we include a summary for the analytical sample restricted to the bandwidth. As discussed in Section 3.5, we can confirm minimal differences in outcome variables between the eligible and non-eligible groups.

Table C.1: Descriptive Statistics

	All		Non-eligible		Eligible	
Variables	Mean	SD	Mean	SD	Mean	SD
Vaccination rates:						
June	0.46	0.50	0.06	0.24	0.52	0.50
August (the Last Survey)	0.86	0.35	0.75	0.43	0.87	0.34
Socio-economic characteristics:						
Female	0.53	0.50	0.52	0.50	0.52	0.50
College Graduate	0.45	0.50	0.50	0.50	0.50	0.50
Employed	0.36	0.48	0.56	0.50	0.42	0.49
Income (million yen)	5.07	3.33	5.50	3.72	5.20	3.39
Assets (million yen)	22.86	23.14	21.87	23.54	23.91	24.32
Outcome variables:						
Local Government Trust	3.00	0.87	3.01	0.89	2.97	0.86
Central Government Trust	2.61	1.02	2.61	1.01	2.60	1.00
Symptoms of Mental Illness	0.27	0.44	0.33	0.47	0.29	0.45
Observations	4,019		733		834	

Note: "Non-eligibele" includes respondents who were born within three years after the vaccination priority policy threshold (from April 2, 1957, to April 1, 1960). "Eligible" includes respondents who were born within three years before the vaccination priority policy threshold (from April 1, 1954, to April 1, 1957). The vaccination rates were calculated from surveys conducted in June and August. Other variables are from the baseline survey in January. Annual income represents the total household income in the year before the survey, and assets represent the balance of financial assets at the time of the survey. For responses of "don't know" or "don't want to answer," the median value was substituted.

Next, we examine the continuity of pre-intervention characteristics using balance tests, following the method by Cattaneo and Titiunik (2022). Specifically, we substitute the dependent variable Y in the regression model specified in Section 3.4 with each characteristic. As shown in Table C.2, row (a), there are no statistically significant differences in socioeconomic attributes between those eligible and not eligible for the priority policy, except for household income.[16] To assess whether this difference is due to statistical noise, we conduct a sensitivity analysis using the donut hole RD approach Barreca et al. (2011). The results, presented in Table C.2, row (b), reveal no significant differences in income within the donut hole RD analysis, confirming that the observed discontinuity in income is not robust.

[16] A potential reason for the observed income difference could be that individuals near the threshold received severance payments or pensions earlier, which may have contributed to an increase in income. Including income as a covariate in our model does not significantly alter the results for trust and mental health.

Table C.2: Balance tests of Pre-intervention Characteristics

Outcomes:	(i) Female	(ii) College Grad	(iii) Employed	(iv) Income	(v) Assets
(a) Fuzzy RDD					
RD Estimate	-0.142	0.018	0.115	3.022	3.720
[LATE]	(0.169)	(0.178)	(0.188)	(1.241)	(8.578)
Observations	1567	1567	1567	1567	1567
(b) Donut Hole RD					
RD Estimate	-0.012	-0.022	0.143	2.434	-7.011
[LATE]	(0.207)	(0.199)	(0.205)	(1.467)	(9.288)
Observations	1546	1546	1546	1546	1546

Note: In this table, balance tests of pre-intervention characteristics are conducted to confirm that local randomization is functioning properly. Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses. The characteristics are measured in the baseline survey in January. Only column (iv), income, shows discontinuity. However, as shown in row (b), when we apply a donut hole RD excluding samples within 30 days before and after the threshold, the discontinuity is not statistically significant. Furthermore, when we use income as a covariate variable in our main analysis, the results show little difference.

Appendix D. Appendix D. Does the Increase in Trust Hold?

Table D.1 presents robustness checks in which negative values of trust on the left side of the threshold are imputed as zero. Column (1) reports the result without imputation, identical to column (1) of Table 3. Columns (2)–(5) show results when extending the imputation window from the threshold up to 60, 90, 120, and 150 days, respectively.

The estimates remain positive and statistically significant, although their magnitudes gradually decrease. Even under the most conservative specification with imputation up to 150 days, the effect size retains more than half of its original magnitude, consistent with the main findings in Table 3. Furthermore, as shown in the bottom row (N of zero imputed), the number of observations with negative values is limited. This suggests that the decline observed in Figure 5 was likely driven by a few outliers.

Table D.1: The Magnitude of Increased Trust among Females with Zero Imputation

	(1) Full	(2) 60	(3) 90	(4) 120	(5) 150
	From Vaccination under Priority Policy to Local Government Trust				
RD Estimate	1.609	1.275	1.080	0.981	0.940
[LATE]	(0.448)	(0.403)	(0.379)	(0.369)	(0.361)
Observations	815	815	815	815	815
N of zero imputed	0	4	7	9	10

Note: Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses. The bottom row reports the number of observations whose values were negative.

Appendix E. Appendix E. Impact of the Second Dose Vaccination on Trust in the government

Similar to ours, Takaku et al. (2025) used a regression discontinuity design to evaluate the impact of priority vaccination on the assessment of COVID-19 measures. They analyzed the effects on individuals who had completed their second vaccination. However, significant number of those who have not received the second dose would have already completed the first dose. Thus, it is challenging to extract a clear effect of vaccination. In this section, nevertheless, we will use our data on the second dose to verify whether our results are consistent with their findings.

Table E.1 shows the estimated impact of the second vaccination on trust. Column (4) indicates that the local government trust increased by 0.635 points ($p<0.1$), while column (1) shows no significant difference in the central government trust. Additionally, column (5) reveals that the local government trust is higher among women. These results are consistent with those in Section 4.1 and, despite using different outcome variables, align with the main message of Takaku et al. (2025).

Table E.1: Impacts of the Second Dose vaccination

	(1) All	(2) Female	(3) Male	(4) All	(5) Female	(6) Male
	Panel A. First Stage Regression From Priority Policy to Vaccination					
RD Estimate	0.669	0.635	0.723	0.669	0.635	0.723
	(0.076)	(0.069)	(0.102)	(0.076)	(0.069)	(0.102)
Observations	1213	631	582	1213	631	582
	Panel B. From Vaccination under Priority Policy to:					
	Central Government Trust			Local Government Trust		
RD Estimate	0.229	-0.073	0.465	0.635	0.936	0.381
[LATE]	(0.286)	(0.326)	(0.472)	(0.372)	(0.429)	(0.587)
Observations	1213	631	582	1213	631	582

Note: Robust bias-corrected standard errors, clustered at prefecture level, are reported in parentheses.The number of observations is smaller than in the previous results because it excludes respondents who received only the first-dose vaccination.