

DISCUSSION PAPER SERIES

IZA DP No. 17533

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ABSTRACT

Economic Preferences Predict COVID-19 Vaccination Intentions and Behavior*

This study investigates the relationship between economic preferences and COVID-19 vaccination readiness using two representative samples of the German population ($N > 5,000$). We elicited altruism, patience, risk-taking and trust using validated survey questions. We find robust, positive relationships between vaccination readiness and both patience and trust. The positive association between altruism and vaccination readiness vanishes when controlling for the other preference dimensions. No consistent effect emerges for risk-taking. Our results underscore the importance of accounting for the interrelated nature of economic preferences when analyzing their impact on field behavior.

JEL Classification: C93, D90, I12

Keywords: economic preferences, vaccination, COVID-19

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1. Introduction

The COVID-19 pandemic represents one of the most severe global health crises in recent history. Alongside profound human distress, it also led to serious economic repercussions. For example, during the pandemic, global GDP shrank by approximately 6.7 percent in 2020 compared to 2019, largely due to restrictions imposed on public life (Szmigiera, 2022). Vaccinations have emerged as a key exit strategy, saving an estimated 1.6 million lives in Europe alone (Meslé et al., 2023). However, vaccination coverage was far from universal in many countries. Therefore, understanding vaccination behavior, along with other containment measures, is crucial for developing effective strategies to manage the spread of current and future diseases (Serra-Garcia and Szech, 2023). Beyond their immediate health benefits, such strategies are essential for reducing the associated economic and social costs of contagious diseases (Pereznieto and Oehler, 2021).

In this paper, we study fundamental economic preferences as determinants of COVID-19 vaccination behavior. Previous studies have established that economic preferences are a key predictor of diverse field behaviors, including educational choices, labor-market participation, and health behavior (e.g., Golsteyn et al., 2014; Sutter et al., 2013; Dohmen et al., 2011; Angerer et al., 2023a; Burks et al., 2015). From a choice-theoretic perspective, one can expect vaccination behavior to correlate with different dimensions of economic preferences. For example, given the societal benefits of vaccination (Böhm and Betsch, 2022), more altruistic individuals are likely to show a higher willingness to vaccinate. However, for other preference dimensions, the direction of the relationship is theoretically ambiguous. For instance, risk-taking could be associated with higher or lower willingness to vaccinate, contingent on whether the perceived risk of the disease outweighs the fear of vaccine-related side effects (Binder and Nuscheler, 2017). Similarly, the relationship between time preferences and vaccination behavior remains unclear in a pandemic context. Higher patience may either increase or decrease vaccination uptake, depending on the specific (opportunity) costs involved, such as restrictions on the unvaccinated (Antonini et al., 2024). Therefore, the relationship between economic preferences and vaccination behavior is ultimately an empirical question.

Importantly, different dimensions of economic preferences are known to be interconnected. For example, Andreoni and Sprenger (2012) note that the certainty of the present and the inherent uncertainty of the future inevitably intertwine risk and time preferences. Similar interrelationships exist among other preference dimensions, such as altruism and trust (e.g., Kosse and Tincani, 2020; Angerer et al., 2015). This implies the necessity to account for multiple preference dimensions when studying the effects of any one. However, little is known about their competing relationships with vaccination intentions. We address this research gap by simultaneously examining the interconnected associations between various economic preferences and COVID-19 vaccination readiness across two representative population samples.

In particular, we conducted two large-scale online surveys with representative samples of the German adult population. Germany offers a particularly compelling context for studying vaccination readiness, given its high COVID-19 vaccine hesitancy compared to other countries (e.g., Lazarus et al., 2023). Both surveys were carried out in early 2021 – the first in late March with 2,030 respondents, and the second in mid-April with 3,045 respondents, during a period when the majority of the population was still

unvaccinated. Utilizing two independent representative samples allows us to assess the replicability of our findings directly, enhancing the credibility of our results (Maniadis et al., 2014). In the surveys, we elicited various economic preferences – altruism, patience, risk-taking, and trust – using validated survey questions proven to effectively measure these dimensions. This approach of using survey-based preference measures is in line with the standard practice in recent economic studies for assessing economic preferences in large samples (e.g., Falk et al., 2018; Cappelen et al., 2023). We combine these preference measures with respondents’ vaccination readiness from the same surveys. We measure vaccination readiness using different survey questions, as well as a revealed-preference measure, where respondents could click on a link to pre-register for a COVID-19 vaccination.

We find robust, positive relationships between specific preferences – namely patience and trust – and vaccination readiness: For instance, in our preferred specification using data from the first survey, a one standard deviation increase in patience (trust) is associated with an increase in vaccination intentions by 14.8 (59.2) percentage points. These relationships are consistent across both surveys, even when controlling for a comprehensive set of background characteristics and other preference dimensions.

Turning to altruism and risk-taking, we do not find a consistent relationship with vaccination readiness across the surveys. Notably, we do observe a positive and significant coefficient on altruism in both surveys, both before and after controlling for respondents’ background characteristics, which aligns with prior research. However, this effect disappears when we account for other preference dimensions. This pattern highlights the importance of examining multiple preference dimensions simultaneously to accurately identify the key drivers of vaccination readiness. For risk-taking, we do not find a consistent directional effect across the different surveys and regression models.

We subject our main findings to a series of robustness tests. Specifically, our results hold when (i) analyzing only respondents who had not yet received a COVID-19 vaccine at the time of the survey, (ii) excluding those who fail an attention check, (iii) using different measures of vaccination readiness as outcomes, and (iv) employing alternative measures of trust. Moreover, our findings are robust to accounting for selection on unobservables, following the approach outlined in Oster (2019). Finally, we replicate our results using data from a third survey conducted two years later, which focuses on actual vaccination behaviors rather than intentions.

We contribute to two strands of literature: one investigating the determinants of vaccination and other health behaviors during the COVID-19 pandemic, and another examining the predictive power of economic preferences for economically relevant field behavior.

Since the outbreak of COVID-19, several studies have investigated factors influencing behaviors that impact virus transmission. A pivotal early study by Serra-Garcia and Szech (2023) examines the effects of choice architecture and monetary incentives on vaccination intentions and COVID-19 testing demand. Their online experiment, conducted from December 2020 to February 2021 when the pandemic was in full effect, shows that both factors significantly influence behaviors. Subsequent studies have examined the influence of factors such as cash incentives, behavioral nudges, social norms, and the design of the vaccine-approval process on vaccination intentions and behavior (e.g., Campos-Mercade et al., 2021a; Angerer et al., 2023b, 2024c). More directly related to our study, several papers have linked vaccination intentions and behavior to economic preferences including altruism (e.g., Böhm and Betsch, 2022; Hajek

and König, 2022), patience (e.g., Blondel et al., 2021; Chan et al., 2024), risk-taking (e.g., Trueblood et al., 2022), and trust (Lazarus et al., 2021; Miyachi et al., 2020; Steinert et al., 2022).¹ We extend this evidence by examining how multiple economic preference dimensions collectively predict vaccination readiness, observing the potentially competing effects of these preferences on vaccination behavior.²

Second, we contribute to the literature on how fundamental economic preferences predict economically relevant field behavior. Time preferences, in particular, have been shown to strongly correlate with various field outcomes. For instance, more patient individuals are more likely to invest effort in job searches (DellaVigna and Paserman, 2005) and human-capital accumulation (Hanushek et al., 2022; Golsteyn et al., 2014), adhere more frequently to physician advice (Van Der Pol et al., 2017), commit fewer crimes (Akerlund et al., 2016), and engage less often in detrimental health behaviors such as smoking (Sutter et al., 2013). Additionally, risk-taking has been linked positively with activities such as stock investments and sports, and negatively with other health behaviors (e.g., Dohmen et al., 2010), though these correlations are often less stable and sometimes not significant (e.g., Sutter et al., 2013; Van Der Pol et al., 2017). Finally, prosocial preferences, including altruism and trust, are positively associated with labor-market success (Kosse and Tincani, 2020), self-assessed health, wages, and educational attainment (Kosse et al., 2020). By examining the influence of various preference dimensions on COVID-19 vaccination intentions, our study extends the evidence on how these preferences interact and impact key health decisions in the context of a global pandemic.

The rest of the paper is structured as follows: Section 2 provides some conceptual considerations regarding the expected relationships between vaccination readiness and different preference dimensions. Section 3 describes the data and the empirical strategy. Section 4 presents our results, and Section 5 concludes.

2. Conceptual Considerations On Economic Preferences and Vaccination Behavior

This section organizes thoughts by discussing the anticipated directions of relationships between economic preference dimensions – altruism, patience, risk-taking, and trust – and vaccination behavior. Drawing on existing literature, we conclude that these predicted relationships are sometimes ambiguous, suggesting that the true nature of these relationships is ultimately an empirical question, which we address in our study.

Altruism is likely positively related to vaccination readiness. Altruistic individuals consider the needs of others when making decisions, sometimes even prioritizing those needs above their own (Fehr and Fischbacher, 2003). Vaccines offer a social benefit by protecting both recipients and those around them (Böhm and Betsch, 2022), suggesting that altruistic individuals are more likely to get vaccinated. Throughout the pandemic, extensive research has consistently shown that altruistic people are more likely to (express intentions to) vaccinate against COVID-19 (e.g., Böhm and Betsch, 2022; Cato et al.,

¹ See Section 2 for a more detailed discussion of these studies.

² A related strand of research examines the determinants of adherence to other COVID-19 containment behaviors. For example, Müller and Rau (2021) and Campos-Mercade et al. (2021b) explore how economic preferences influence behaviors such as social distancing, staying at home, or buying face masks.

2022; Hajek and König, 2022; Rieger et al., 2020). Consequently, we anticipate a similar positive relationship in our data.

The relationship between patience and vaccination behavior is a priori less clear. On one hand, more patient individuals, who value future benefits over immediate costs, may choose to vaccinate now for the long-term health protection it provides (see Blondel et al., 2021; Chan et al., 2024, for supporting evidence). On the other hand, these same individuals might also place less weight on the immediate costs associated with restrictions for not being vaccinated, such as limitations on travel or social gatherings, anticipating that these activities will resume once the pandemic subsides (Antonini et al., 2024). Consequently, their higher tolerance for delayed gratification might lessen the urgency to vaccinate immediately.

The impact of risk-taking on vaccination decisions is similarly ambiguous. Individuals faced a choice between two risky options: getting vaccinated or not, both associated with significant uncertainties due to the novel nature of the virus and the vaccines. The balance between the perceived risks of infection and the uncertainties of receiving a newly developed vaccine could lead to either a positive or negative correlation between risk-taking and vaccination readiness (Crainich et al., 2019). Consistently, current research presents mixed results: some studies indicate a positive association between risk-taking and vaccination intentions against COVID-19 (Trueblood et al., 2022), while others find no significant relationship (Chan et al., 2024).³ Given this, it is ex ante unclear in which direction risk preferences are linked to COVID-19 vaccination readiness and behavior.

Turning to trust, we expect a positive association with vaccination readiness for two main reasons. First, there is substantial evidence supporting a strong link between trust and altruism (e.g., Kosse and Tincani, 2020), which we expect to positively correlate with vaccination readiness (see above). Second, general trust likely has a direct connection to vaccination readiness, independent of its relationship with altruism: Individuals with high general trust in people are also more likely to trust the COVID-19 vaccine and the institution involved in its development and administration, such as scientific bodies and the government – a relationship we confirm with our data below. Consequently, extensive evidence shows that higher trust correlates positively with vaccination intentions and behavior, regardless of whether one considers trust directed toward the healthcare system (Wake, 2021), the pharmaceutical industry, the government (Lazarus et al., 2021; Miyachi et al., 2020; Steinert et al., 2022), or the vaccine itself (Angerer et al., 2023b).

³ Earlier studies focusing on vaccination readiness before the COVID-19 pandemic suggested a negative correlation between vaccination behavior and risk-taking (Guo et al., 2020; Crainich et al., 2019; Tsutsui et al., 2012), and document gender differences in this relationship (Nuscheler and Roeder, 2016; Binder and Nuscheler, 2017). However, this evidence may not directly apply to the COVID-19 context, marked by unprecedented uncertainties surrounding both the virus and the new vaccines.

Table 1: Descriptive statistics of respondents' characteristics (both surveys)

	First Survey			Second Survey			Min	Max
	Mean	(SD)	Obs.	Mean	(SD)	Obs.		
Female	0.50	(0.50)	2030	0.49	(0.50)	3045	0	1
Age (in years)	45.01	(14.59)	2030	45.03	(14.69)	3045	18	69
Born in Germany	0.95	(0.23)	2030	0.94	(0.24)	3044	0	1
Living in the East of Germany	0.19	(0.39)	2030	0.19	(0.39)	3045	0	1
Equ. Household Size	1.58	(0.50)	2029	1.57	(0.48)	3043	1	3.9
Equ. Household Income (1k Euro)	1.70	(0.90)	2015	1.70	(0.89)	3025	1	6
Currently Working	0.61	(0.49)	2030	0.60	(0.49)	3043	0	1
University Degree	0.10	(0.30)	2029	0.11	(0.31)	3044	0	1
Highest School Degree								
No Degree/Basic Degree	0.28	(0.45)	2030	0.28	(0.45)	3045	0	1
Middle School Degree	0.33	(0.47)	2030	0.33	(0.47)	3045	0	1
University Entrance Qualification	0.39	(0.49)	2030	0.39	(0.49)	3045	0	1
Political Party Preferences								
AfD	0.09	(0.29)	2030	0.08	(0.27)	3045	0	1
CDU	0.19	(0.39)	2030	0.21	(0.41)	3045	0	1
SPD	0.13	(0.34)	2030	0.13	(0.34)	3045	0	1
FDP	0.07	(0.25)	2030	0.07	(0.25)	3045	0	1
Die Gruenen	0.16	(0.37)	2030	0.16	(0.37)	3045	0	1
Die Linke	0.07	(0.26)	2030	0.08	(0.27)	3045	0	1
Other	0.03	(0.17)	2030	0.03	(0.18)	3045	0	1
None	0.26	(0.44)	2030	0.23	(0.42)	3045	0	1
Economic preferences								
Risk-Taking	4.07	(2.52)	2030	4.05	(2.60)	3045	0	10
Patience	6.47	(2.42)	2029	6.86	(2.26)	3044	0	10
Altruism	7.23	(2.27)	2029	7.40	(2.10)	3045	0	10
Trust								
Trust in Others	2.40	(0.65)	2028	2.46	(0.64)	3044	1	4
Trust in the Government	2.02	(0.79)	2029	2.04	(0.79)	3044	1	4
Trust in Science	2.81	(0.79)	2029	2.86	(0.81)	3044	1	4
COVID-19								
Already Vaccinated	0.08	(0.27)	2030	0.15	(0.36)	3045	0	1
Already Infected	0.07	(0.25)	2030	0.06	(0.24)	3044	0	1
Non Response	0.00	-	2030	0.01	(0.07)	3045	0	1

Note: The table shows means, standard deviation (SD), the number of observations (Obs.), minimum, and maximum values. Variables description: Equalized Household Size is a measure of household size using a standard (equivalence) scale, the so-called modified OECD scale. This scale gives a weight of 1 to the first adult in the household, 0.5 to each other person in the household aged 14 years or older, and 0.3 to each child under the age of 14 years and adds them up. Equalized Household Income corresponds to the reported household income (in Euros) divided by the equalized household size. University Degree takes on the value one if respondents report having graduated from university. Currently Working takes on the value 1 if respondents report being employed or self-employed. Political Party Preference was elicited by asking respondents which party they generally sympathize with. We elicited whether respondents were already vaccinated (i.e., if they already received their first dose of some COVID-19 vaccine). Additionally, we asked whether respondents have already had a COVID-19-infection using a 4-point scale (1 “Yes, sure”; 2 “Probably Yes”; 3 “Probably No”; 4 “No, sure”) and transformed it into a binary indicator where one corresponds to “Yes” (1 & 2) and zero to “No” (3 & 4). Risk-taking, patience, and altruism were measured on 11-point scales (0 “no agreement”; 10 “total agreement”). Trust was measured using a 4-point scale ranging from “very low trust” (1) to “very high trust” (4). Non-response takes the value 1 if respondents did not provide an answer to the question regarding their intention to vaccinate (ITV).

3. Data and Study Design

3.1. Data Collection and Sample

We conducted two representative online surveys involving over 5,000 adults (18-69 years) in Germany.⁴ Both samples were drawn from an online access panel by the polling company *Respondi*, ensuring they match the official population statistics in terms of age, gender, educational attainment, and federal state of residence. Each survey was independent, with no overlap in respondents. The first survey of 2,030 respondents took place from March 24 to April 2, 2021, and the second of 3,045 respondents from April 8 to April 22, 2021. During these periods, a significant portion of the population remained unvaccinated, and the nationwide vaccine rollout was just beginning to gain momentum. Appendix Figure A1 shows the development of vaccination rates in Germany, and the timing of the surveys. Appendix B presents background information about vaccine rollout in Germany, as well as polling details.

Table 1 presents the sample characteristics of both surveys, illustrating that both samples closely align in observable characteristics.⁵ An important feature of the surveys is their representativeness for the German population. Comparing respondent characteristics pooled across both surveys with official population statistics from the *German Microcensus (2015)*, Appendix Table A1 demonstrates that our samples closely match population characteristics.⁶

In the survey, we incorporated validated questions to measure economic preferences, and a set of questions assessing COVID-19 vaccination readiness, including a revealed preference measure. We detail both sets of questions below. Additionally, the surveys collected comprehensive socio-demographic background information and assessed respondents' attentiveness.

3.2. Eliciting Economic Preferences

We focus on four fundamental economic preferences – altruism, patience, risk-taking, and trust – that are likely related to vaccination readiness (see Section 2 for a detailed discussion). Below, we describe how these preferences were elicited.

Altruism, patience, and risk-taking were measured using survey questions following *Falk et al. (2018)*. We asked respondents "*Are you someone who is generally willing to share with others without expecting anything in return, or are you unwilling to do so?*" for altruism, "*Are you someone who is generally willing to give up something today to benefit from it in the future or are you not willing to do so?*" for patience, and "*How do you rate yourself personally? Are you generally a risk-taker or do you try to avoid taking risks?*" for risk-taking. Answers were recorded on an 11-point scale from 0 to 10, where higher numbers indicate a stronger manifestation of the trait. These preference measures are validated by their proven ability

⁴ The under-70 age group is particularly relevant to our research question as vaccination hesitancy is notably higher among relatively younger individuals compared to older ones (e.g., *Robinson et al., 2021*).

⁵ Both surveys also incorporated randomized elements unrelated to the specific research question of this paper, specifically a hypothetical vignette experiment and an information-provision experiment (for details, see *Angerer et al., 2023b, 2024c*).

⁶ *Grewenig et al. (2018)* show that online samples like ours effectively represent the general population. Additionally, *Peyton et al. (2022)* find that online experiments from before the COVID-19 pandemic replicate well during it, confirming the generalizability of online studies across different periods.

to predict behavior in incentivized experiments and various economically relevant field behaviors (e.g., [Vieider et al., 2015](#); [Bonin et al., 2007](#); [Falk et al., 2022](#)).

Drawing on questions from the World Value Survey ([Haerper et al., 2022](#)) and the German Socio-Economic Panel ([Goebel et al., 2019](#)), we assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 "very low trust" to 4 "very high trust". These trust measures, used in both surveys, show strong correlations with each other and with trust in the COVID-19 vaccine, which we measured only in the second survey (see [Table A2](#)).⁷ For our main analysis, we use a general trust index, calculated as the arithmetic mean of responses to the three trust questions. This index simplifies the presentation of results and addresses concerns about multiple hypothesis testing ([Anderson, 2008](#)). Additionally, we consider the different trust questions individually in our robustness analysis.

Next, we study the relationship between the four preference measures. The correlation matrices in [Table 2](#) reveal consistent patterns across both surveys: altruism correlates positively with patience and trust, patience with risk-taking and trust, and risk-taking with trust. Altruism also correlates positively with risk-taking in the first survey but not in the second. These interconnections highlight the need to account for all preferences when analyzing each one's relationship with vaccination readiness. For comparability, we z-standardize each preference measure within each survey to have a mean of zero and a standard deviation of one.

3.3. Eliciting Vaccination Intentions

We measured respondents' self-reported intention to vaccinate (ITV) by asking them to indicate their agreement with the statement: (1) "*I will get vaccinated against COVID-19 as soon as a vaccine is available for me.*" Responses were recorded on a 5-point scale.⁸ We transformed answers into a binary variable, coded as one if the respondent agreed with the statement (answer options 4 and 5), and zero otherwise.

For robustness, we elicited additional measures of vaccination readiness in the second survey. Alongside the primary ITV question, we included the following statements to capture vaccination intentions: (2) "*If I could choose the vaccine myself, I would get vaccinated against COVID-19 as soon as a vaccination is available for me.*"; (3) "*If I had the chance, I would get vaccinated tomorrow with the AstraZeneca vaccine.*"; (4) "*If I had the chance, I would get vaccinated tomorrow with the BioNTech and Pfizer vaccine.*" We recorded responses using the same 5-point agreement scale (see [Footnote 8](#)). To complement these non-incentivized survey measure, we also added a revealed-preference measure by offering respondents a link to pre-register for a COVID-19 vaccination. We asked: (5) "*Would you like to receive a link to pre-register for a COVID-19 vaccination at the end of this survey?*" Respondents who answered affirmatively were provided with the link to the corresponding governmental webpage. We tracked clicking on this link as our outcome variable of interest. We then constructed an index of vaccination readiness (ITV

⁷ We assessed trust in the COVID-19 vaccine by eliciting respondents' agreement with the statement: "*I fully trust the COVID-19 vaccine,*" on a 5-point scale from 1 "*I fully disagree*" to 5 "*I fully agree*."

⁸ Answer options: [5] "*I fully agree*", [4] "*I rather agree*", [3] "*Neither nor*", [2] "*I rather disagree*", [1] "*I fully disagree*". To minimize central tendency bias, the "*Neither nor*" option was placed below the other four categories. Methodological experiments by [Lergetporer and Woessmann \(2019\)](#) demonstrate that this approach reduces central-tendency bias without affecting the relative frequency of other responses.

Table 2: Correlations between different economic preferences

	<i>Altruism</i>	<i>Patience</i>	<i>Risk-taking</i>	<i>Trust Index</i>
Panel A: first survey				
Altruism	1.000			
Patience	0.378***	1.000		
Risk-taking	0.071***	0.144***	1.000	
Trust Index	0.154***	0.261***	0.174***	1.000
Panel B: second survey				
Altruism	1.000			
Patience	0.384***	1.000		
Risk-taking	-0.006	0.133***	1.000	
Trust Index	0.127***	0.227***	0.056***	1.000

Note: The table reports Spearman’s Rank correlation coefficients between different economic preferences. Economic Preferences: Altruism, patience, and risk-taking were measured on 11-point scales (0 “no agreement”; 10 “total agreement”). We assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 “very low trust” to 4 “very high trust”. We constructed an index (Trust Index) by calculating the arithmetic mean of these three trust-related questions. Please refer to [Section 3.2](#) for a description of the different economic preferences. We have 5071 observations, 2028 observations in the first, and 3043 in the second survey.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Index) comprising these different measures. The ITV index was calculated as the arithmetic mean of the binarized outcomes.

3.4. Supplementary Survey on Realized Vaccination Behavior

Survey-based measures of prospective behavior, like those we use to assess COVID-19 vaccination readiness in our analysis, are sometimes criticized because it is unclear how well these expectations translate into actual vaccination behavior. To verify whether our main findings hold when considering *realized* vaccination behavior as outcome, we included some of our preference measures along with a question about vaccination behavior in another survey conducted in 2023, after COVID-19 vaccines have become widely available and infections had significantly subsided.

This representative online survey with 2,180 respondents, conducted by the polling company *CINT* between August and September 2023, was drawn to match population statistics for age, gender, educational background, and state of residency. The sociodemographic characteristics of respondents to this survey are presented in Appendix [Table A3](#). Although the survey’s primary focus was on behavioral experiments related to discrimination and cooperation ([Angerer et al., 2024b,a](#)), we added questions eliciting COVID-19 vaccination status (“*Have you already received one or more doses of a COVID-19 vaccine?*”), as well as altruism, patience, and risk-taking. Due to survey-space constraints, the trust question was

omitted. We use this dataset to assess the replicability of our findings on these preference dimensions concerning actual vaccination behavior.

3.5. Empirical Model

We employ the following regression model to examine how COVID-19 vaccination readiness relate to economic preferences:

$$ITV_i = \alpha_0 + \sum_{j=1}^5 \alpha_j Pref_{ij} + \delta \mathbf{B}_i + \epsilon_i \quad (1)$$

ITV_i is the outcome of interest for respondent i , encompassing the intention to vaccinate (ITV), the ITV Index, clicking on a vaccine pre-registration link, and actual vaccination behavior. $Pref_{ij}$ denotes the standardized measure of economic preference j (altruism, patience, risk-taking, and trust). \mathbf{B}_i is a vector of control variables that includes a comprehensive set of respondents' background characteristics, and ϵ_i is the error term. We start by analyzing each preference individually before combining them in the model to address their interrelatedness. Our coefficients of interest, α_1 through α_4 , quantify the impact of these preferences on vaccination readiness.

4. Results

4.1. Main Results

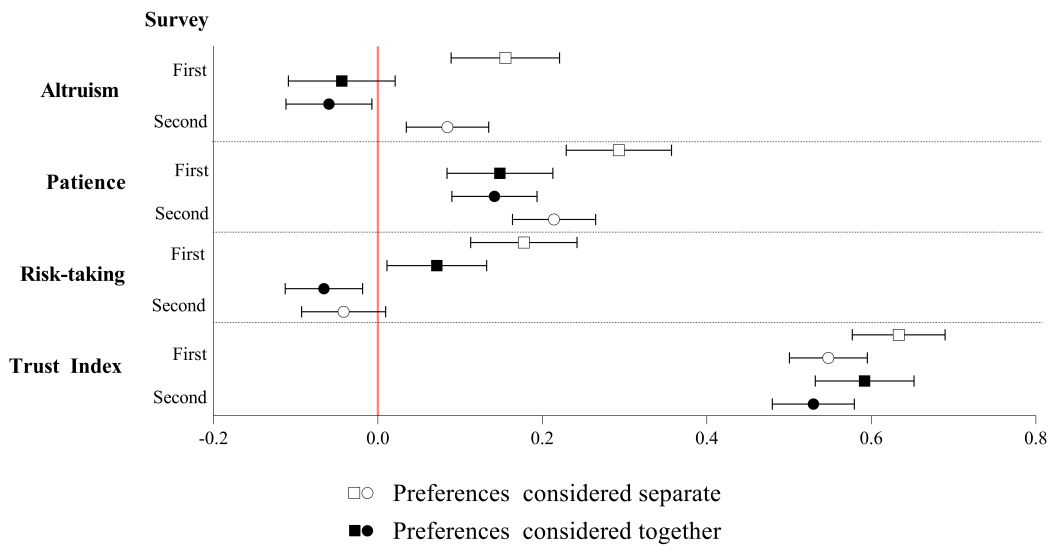
[Figure 1](#) displays coefficient plots for the four preference measures based on [Equation 1](#), with the binary measure of vaccination intentions as the dependent variable. For each preference, we show separate coefficients for the first and the second survey. All underlying regressions control for respondents' background characteristics. Coefficients depicted in white do not account for other preference dimensions, while those in black do. The underlying regressions are presented in the even-numbered columns of [Table A4](#).

The figure shows that both patience and trust are robustly and positively associated with vaccination intentions. This positive relationship holds consistently across both surveys and remains strong even when controlling for other preference dimensions. Using data from the first survey, a one standard deviation increase in patience is linked to a 14.8 (14.2) percentage point increase in vaccination intentions in our preferred specification which also accounts for the other economic preferences. Similarly, a one standard deviation increase in trust is associated with a 59.2 percentage point increase in vaccination intentions. Coefficients are very similar when using data from the second survey.

The pattern for the other two preference dimensions is markedly different. For altruism, we observe a positive and significant coefficient – a finding consistent across both surveys and with previous literature (e.g., [Hajek and König, 2022](#)) – when other preferences are not controlled for. However, when including other preference dimensions, this relationship turns negative and becomes significantly so in

the second survey. This reversal in the sign of the altruism coefficient highlights the necessity of considering the interrelatedness of different preferences. For risk-taking, while the coefficient's sign remains stable within each survey upon controlling for other preferences, it varies between surveys – positive in the first and negative in the second. This inconsistency supports the uncertain a priori predictions about risk-taking's influence discussed in [Section 2](#).

Figure 1: Associations between intentions to vaccinate and economic preferences



Note: This coefficient plot shows the associations between the intention to vaccinate (ITV) and economic preferences when controlling for respondents' additional background characteristics (see [Table A4](#) for the regression results).

In sum, we have identified patience and trust as consistent predictors of COVID-19 vaccination intentions, while the relationship between vaccination intentions and both altruism and risk-taking remain inconclusive and unstable. The next section will subject these findings to a series of robustness tests.

4.2. Robustness Checks

Given that our samples were drawn at the start of the vaccination campaign in spring 2021, most of our respondents had not yet been vaccinated (88%), while some had received at least the first dose (12%). Including those already vaccinated in our regression could pose concerns, as their vaccination intentions might be influenced by their experiences, which could, among other effects, reduce vaccine uncertainty. Consequently, their economic preferences might relate differently to vaccination intentions compared to those unvaccinated. Thus, [Appendix Table A5](#) presents results for respondents who had not yet received a vaccine at the time of the survey. We find that our main results hold in this subgroup, implying that respondents' vaccination status does not drive our overall results.

Another concern when analyzing survey data is the potential bias from respondents' inattention. This

inattention could introduce noise in survey responses, potentially obscuring the true relationships between vaccination readiness and economic preferences (e.g., [Stantcheva, 2022](#)). To address this, we incorporated a simple attention check in both surveys by including the following question: “*It sometimes happens that survey respondents do not read individual questions accurately. To ensure that you read the questions accurately, we ask you to ignore the following question and enter the number twenty-two in the text box. The federal states are responsible for organizing vaccination against COVID-19. In how many states do you estimate that primary care physicians are already providing vaccination nationwide? In _____ of the total of 16 federal states.*” A reassuring 72% of respondents in the first survey and 74% in the second survey passed this attention check. Our findings remain robust when the analysis is limited to respondents who passed this check (see Appendix [Table A6](#)), suggesting that survey inattention does not distort our results.

Our results also remain robust when we consider alternative measures of vaccination readiness as outcomes. As detailed in [Section 3.3](#), in addition to the main survey question measuring vaccination intentions, we used three supplementary survey questions and the revealed-preference measure of clicking on the vaccine pre-registration link in the second survey. By combining these measures, and our intention-to-vaccinate measure, into one ITV Index, Appendix [Table A7](#) re-estimates our main regression models using this composite outcome. Reassuringly, the associations between vaccination intentions and our preference measures hold when using this index instead of a single question.

A notable component of the ITV Index is our revealed-preference measure: clicking on a vaccine pre-registration link. Given some skepticism around using unincentivized survey measures as outcomes, researchers sometimes incorporate (incentivized) behavioral measures, such as donations to political organizations or signing petitions, to complement survey-based preference measures ([Haaland et al., 2020](#)). Building on this approach, we included a measure for clicking on a vaccination pre-registration link, a method also employed in other studies on vaccination intentions (e.g., [Esguerra et al., 2023](#)). [Table 3](#) presents the associations between clicking the pre-registration link and economic preferences. Our findings are robust to using this alternative, behavioral measure for vaccination intentions, demonstrating that our results are not limited to unincentivized survey outcomes.

As outlined in [Section 3.2](#), our main analysis uses a trust index that combines respondents’ trust in other people, the government, and science. Appendix [Table A8](#) shows that using individual trust items as alternative measures instead of the trust index yields consistent findings, with coefficients remaining positive and statistically significant across all specifications.

Next, we provide evidence that our results hold when accounting for selection on unobservable factors. Therefore, we use the analytical framework for unobservable selection proposed by [Oster \(2019\)](#). In this analysis, we compare our preferred regression model (column 10 of Appendix [Table A4](#)) with restricted models that include no controls (column 1, 3, 5, and 7 of the same table). Following [Oster \(2019\)](#), we set $R_{max} = 1.3\tilde{R}$, where R_{max} is the R-squared from a hypothetical regression of the outcome on both observed and unobserved controls, and \tilde{R} is the R-squared from a regression with all observable controls (in our case, column 10 of [Table A4](#)). We calculate the proportional degree of selection on unobservables, δ , necessary to nullify the observed associations (i.e., $\alpha_j = 0$). The results are shown in Appendix [Table A9](#) for both surveys. They indicate that the necessary δ , which equates the strength of selection on unobservables to that of observables, exceeds the critical value of 1 in all cases, except

Table 3: Association between a clicking link for vaccine preregistration and economic preferences

	Click on link: behavioral measure of intention to vaccinate									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Altruism	0.015** (0.007)	0.015** (0.007)							-0.003 (0.008)	-0.001 (0.008)
Patience			0.036*** (0.007)	0.028*** (0.007)					0.023*** (0.008)	0.017** (0.008)
Risk-taking					0.004 (0.007)	0.000 (0.007)			-0.003 (0.007)	-0.003 (0.007)
Trust Index							0.064*** (0.007)	0.061*** (0.008)	0.059*** (0.008)	0.058*** (0.008)
Covariates		✓		✓		✓		✓		✓
R-squared	0.001	0.065	0.007	0.068	0.000	0.064	0.023	0.082	0.026	0.084
Observations	3045	3045	3044	3044	3045	3045	3044	3044	3043	3043

Note: For this table, we only consider respondents from the second survey. OLS regressions: Association between respondents' economic preferences and a behavioral measure for vaccination intention (clicking on a link to pre-register for a COVID-19 vaccination). **Click on Link:** We elicited whether respondents would like to receive a link to pre-register for a COVID-19 vaccine at the end of the survey. They could answer with "Yes" or "No". We provided those who said yes with the corresponding governmental web page and recorded whether they clicked it. We coded the outcome as zero for those who did not request a link in the first place. Economic Preferences: Altruism, patience, and risk-taking were measured on 11-point scales (0 "no agreement"; 10 "total agreement"). We assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 "very low trust" to 4 "very high trust". We constructed an index (Trust Index) by calculating the arithmetic mean of these three trust-related questions. To facilitate comparability, we standardize our measures using z-scores by subtracting the mean and dividing by the standard deviation. We control for respondents' additional background characteristics in uneven columns. Covariates: Female, age, born in Germany, living in East Germany, equalized household income, university degree, highest school degree (university entrance qualification), currently working, political party preferences (conservative), and a dummy indicating whether participants had already received a COVID-19 vaccination (see Table 1 for a description of these variables). Missing values of covariates are imputed. All regressions include imputation dummies.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

for altruism in the first survey. In other words, the degree of selection on unobservables would have to be markedly *larger* than selection on observables to eliminate the main results, a scenario considered unlikely (Oster, 2019).

Our final robustness test examines whether our main results hold when considering actual vaccination behavior instead of vaccination intentions as the outcome. Therefore, we utilize the supplementary survey data from fall 2023, as described in Section 3.4, which collected information on vaccination status and selected economic preferences. Table 4 presents regression results based on Equation 1. Columns 1-6 show coefficients when the different economic preference dimensions are considered separately, and columns 7-8 incorporate all preference dimensions simultaneously. Odd-numbered columns do not include control variables, while even-numbered columns account for respondents' background characteristics. Notably, the positive and significant coefficient on patience, previously documented for vaccination intentions, is also prevalent in all regressions considering actual vaccination status. The coefficient on altruism is positive and marginally significant without covariates (column 1), but becomes insignificant when including background characteristics and other preference dimensions, consistent with our above findings on vaccination intentions. In these analyses, risk-taking shows a significant negative relationship with vaccination status, diverging from the relationship documented for vaccina-

tion readiness. Although the dataset lacks information on trust, preventing replication of its effects on vaccination behavior, the overall pattern confirms that our findings, particularly regarding patience, are robust when using actual rather than prospective vaccination behavior.

Table 4: Association between COVID-19 vaccination status and economic preferences

	Vaccinated (at least one dose)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Altruism	0.014*	0.010					0.005	0.005
	(0.008)	(0.008)					(0.009)	(0.009)
Patience			0.024***	0.018**			0.028***	0.021**
			(0.008)	(0.008)			(0.009)	(0.009)
Risk-taking					-0.021***	-0.020**	-0.028***	-0.026***
					(0.008)	(0.009)	(0.008)	(0.009)
Covariates		✓		✓		✓		✓
R-squared	0.001	0.041	0.004	0.043	0.003	0.043	0.010	0.047
Observations	2179	2179	2179	2179	2179	2179	2179	2179

Note: For this table, we use supplementary data from the 2023 survey. We use OLS regressions to explore the relationship between respondents' economic preferences and their COVID-19 vaccination status. The dependent variable (**Vaccination Status**) indicates whether respondents had already been vaccinated against COVID-19. The relevant survey question was "Have you already received one or more doses of a COVID-19 vaccine?" with possible responses being "Yes" or "No". Out of 2179 respondents, 1829 (83.9%) reported having received at least one dose of the COVID-19 vaccine. Economic Preferences: Altruism, patience, and risk-taking were measured on 11-point scales (0 "no agreement"; 10 "total agreement"). To facilitate comparability, we standardize our measures using z-scores by subtracting the mean and dividing by the standard deviation. We control for respondents' additional background characteristics in uneven columns. Covariates: Female, age, born in Germany, living in East Germany, equalized household income, university degree, highest school degree (university entrance qualification), currently working, and political party preferences (conservative). Missing values of covariates are imputed. All regressions include imputation dummies.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

5. Conclusion

This study investigates the link between COVID-19 vaccination intentions and behavior and fundamental economic preferences – altruism, patience, risk-taking and trust. Therefore, we conducted two large-scale online surveys with a representative sample of the German adult population, involving more than 5,000 respondents in spring 2021, a period when many had not yet received a COVID-19 vaccination. Additionally, we utilized a complementary representative dataset ($N > 2,000$) collected in fall 2023, after vaccines had become widely available, to examine how these preferences correlate with realized vaccination behavior.

We find robust, positive relationships between patience and trust and vaccination readiness, which persist when accounting for a comprehensive set of respondent characteristics and other preference dimensions. In contrast, the links between altruism and risk-taking and vaccination readiness are neither stable nor consistent. Our findings highlight the importance of considering the intertwined nature of different preference dimensions, as controlling for these can alter the significance and direction of observed relationships. Our results remain robust across various checks, including different respondent

subsamples, alternative measures of vaccination readiness and behavior, and accounting for selection on observables.

From a policy perspective, our findings could potentially inform strategies for vaccination campaigns. Results suggest that targeting impatient individuals might enhance vaccination rates. Additionally, efforts to boost trust in vaccines and associated institutions through informed campaigns or improvements in the COVID-19 vaccine approval process ([Angerer et al., 2023b](#)) could help increase vaccination uptake. For future research, it would be interesting to investigate how fundamental economic preferences influence the effectiveness of pro-vaccination interventions, such as nudges or monetary incentives (e.g., [Serra-Garcia and Szech, 2023](#); [Campos-Mercade et al., 2021a](#)).

References

- Akerlund, D., Golsteyn, B. H. H., Grönqvist, H., and Lindahl, L. (2016). Time discounting and criminal behavior. *Proceedings of the National Academy of Sciences*, 113(22):6160–6165.
- Anderson, M. L. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the abecedarian, perry preschool, and early training projects. *Journal of the American Statistical Association*, 103:1481–1495.
- Andreoni, J. and Sprenger, C. (2012). Risk preferences are not time preferences. *American Economic Review*, 102(7):3357–76.
- Angerer, S., Baier, H., Glätzle-Rützle, D., Lergetporer, P., and Rittmannsberger, T. (2024a). Cooperation and punishment in the general population: Evidence from a representative experiment in germany. *mimeo*.
- Angerer, S., Bolvashenkova, J., Glätzle-Rützler, D., Lergetporer, P., and Sutter, M. (2023a). Children’s patience and school-track choices several years later: Linking experimental and field data. *Journal of Public Economics*, 220:104837.
- Angerer, S., Brosch, H., Glätzle-Rützle, D., Lergetporer, P., and Rittmannsberger, T. (2024b). Discrimination in the general population. *CESifo Working Paper*, 11117.
- Angerer, S., Glätzle-Rützler, D., Lergetporer, P., and Rittmannsberger, T. (2023b). How does the vaccine approval procedure affect COVID-19 vaccination intentions? *European Economic Review*, 158:104504.
- Angerer, S., Glätzle-Rützler, D., Lergetporer, P., and Rittmannsberger, T. (2024c). Beliefs about social norms and gender-based polarization of covid-19 vaccination readiness. *European Economic Review*, 163:104640.
- Angerer, S., Glätzle-Rützler, D., Lergetporer, P., and Sutter, M. (2015). Donations, risk attitudes and time preferences: A study on altruism in primary school children. *Journal of Economic Behavior & Organization*, 115:67–74.
- Antonini, M., Attema, A. E., Genie, M., Torbica, A., and Paolucci, F. (2024). Time preferences and covid-19 vaccination uptake. *EuHEA Conference Vienna*.
- Binder, S. and Nuscheler, R. (2017). Risk-taking in vaccination, surgery, and gambling environments: Evidence from a framed laboratory experiment. *Health Economics*, 26:76–96.
- Blondel, S., Langot, F., Mueller, J., and Sicsic, J. (2021). Preferences and covid-19 vaccination intentions.
- Böhm, R. and Betsch, C. (2022). Prosocial vaccination. *Current opinion in psychology*, 43:307–311.
- Bonin, H., Dohmen, T., Falk, A., Huffman, D., and Sunde, U. (2007). Cross-sectional earnings risk and occupational sorting: The role of risk attitudes. *Labour Economics*, 14(6):926–937.
- Bundesministerium für Gesundheit (2022). Impfdashboard.
- Bundesregierung (2021). Diese reihenfolge gilt bei der impfung.

- Burks, S. V., Nosenzo, D., Anderson, J., Bombyk, M., Ganzhorn, D., Goette, L., and Rustichini, A. (2015). Lab measures of other-regarding preferences can predict some related on-the-job behavior: Evidence from a large scale field experiment. Discussion Papers 2015-21, The Centre for Decision Research and Experimental Economics, School of Economics, University of Nottingham.
- Campos-Mercade, P., Meier, A. N., Schneider, F. H., Meier, S., Pope, D., and Wengström, E. (2021a). Monetary incentives increase covid-19 vaccinations. *Science*, 374(6569):879–882.
- Campos-Mercade, P., Meier, A. N., Schneider, F. H., and Wengström, E. (2021b). Prosociality predicts health behaviors during the covid-19 pandemic. *Journal of public economics*, 195:104367.
- Cappelen, A. W., Enke, B., and Tungodden, B. (2023). Universalism: Global evidence. *American Economic Review*. Forthcoming.
- Cato, S., Iida, T., Ishida, K., Ito, A., Katsumata, H., McElwain, K. M., and Shoji, M. (2022). Vaccination and altruism under the covid-19 pandemic. *Public Health in Practice*, 3:100225.
- Chan, H. F., Rizio, S. M., Skali, A., and Torgler, B. (2024). Patience predicts attitudes toward vaccination and uptake of vaccines. *Social Psychological and Personality Science*, 15(6):639–649.
- Crainich, D., Eeckhoudt, L., and Menegatti, M. (2019). Vaccination as a trade-off between risks. *Italian Economic Journal*, 5(3):455–472.
- DellaVigna, S. and Paserman, M. D. (2005). Job search and impatience. *Journal of Labor Economics*, 23(3):527–588.
- Dohmen, T., Falk, A., Huffman, D., and Sunde, U. (2010). Are risk aversion and impatience related to cognitive ability? *American Economic Review*, 100(3):1238–60.
- Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., and Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*, 9(3):522–550.
- Esguerra, E., Vollmer, L., and Wimmer, J. (2023). Influence motives in social signaling: Evidence from covid-19 vaccinations in germany. *American Economic Review: Insights*, 5(2):275–91.
- Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., and Sunde, U. (2018). Global evidence on economic preferences. *The Quarterly Journal of Economics*, 133(4):1645–1692.
- Falk, A., Becker, A., Dohmen, T., Huffman, D., and Sunde, U. (2022). The preference survey module: A validated instrument for measuring risk, time, and social preferences. *Management Science*, 69(4):1935–1950.
- Fehr, E. and Fischbacher, U. (2003). The nature of human altruism. *Nature*, 425(6960):785–791.
- German Microcensus (2015). Research Data Centres of the Federal Statistical Office and the statistical offices of the Laender.
- Goebel, J., Grabka, M. M., Liebig, S., Kroh, M., Richter, D., Schroeder, C., and Schupp, J. (2019). The german socio-economic panel (soep). *Journal of Economics and Statistics*, 239(2):345–360.

- Golsteyn, B. H., Grönqvist, H., and Lindahl, L. (2014). Adolescent time preferences predict lifetime outcomes. *The Economic Journal*, 124(580):F739–F761.
- Grewenig, E., Lergetporer, P., Simon, L., Werner, K., and Woessmann, L. (2018). Can online surveys represent the entire population? *SSRN Electronic Journal*.
- Guo, N., Wang, J., Nicholas, S., Maitland, E., and Zhu, D. (2020). Behavioral differences in the preference for hepatitis b virus vaccination: A discrete choice experiment. *Vaccines*, 8(3):527.
- Haaland, I., Roth, C., and Wohlfart, J. (2020). Designing information provision experiments. *Journal of Economic Literature*, forthcoming.
- Haerpfer, C., Inglehart, R., Moreno, A., Welzel, C., Kizilova, K., Diez-Medrano, J., Lagos, M., Norris, P., Ponarin, E., and Puranen, B. (2022). World values survey: Round seven – country-pooled datafile version 4.0.0.
- Hajek, A. and König, H.-H. (2022). Level and correlates of empathy and altruism during the covid-19 pandemic. evidence from a representative survey in germany. *Plos one*, 17(3):e0265544.
- Hanushek, E. A., Kinne, L., Lergetporer, P., and Woessmann, L. (2022). Patience, risk-taking, and human capital investment across countries. *The Economic Journal*, 132(646):2290–2307.
- Kosse, F., Deckers, T., Pinger, P., Schildberg-Hörisch, H., and Falk, A. (2020). The formation of prosociality: Causal evidence on the role of social environment. *Journal of Political Economy*, 128(2).
- Kosse, F. and Tincani, M. M. (2020). Prosociality predicts labor market success around the world. *Nature Communications*, 11.
- Lazarus, J. V., Ratzan, S. C., Palayew, A., Gostin, L. O., Larson, H. J., Rabin, K., Kimball, S., and El-Mohandes, A. (2021). A global survey of potential acceptance of a covid-19 vaccine. *Nature medicine*, 27(2):225–228.
- Lazarus, J. V., Wyka, K., White, T. M., Picchio, C. A., Gostin, L. O., Larson, H. J., Rabin, K., Ratzan, S. C., Kamarulzaman, A., and El-Mohandes, A. (2023). A survey of covid-19 vaccine acceptance across 23 countries in 2022. *Nature Medicine*, 29(2):366–375.
- Lergetporer, P. and Woessmann, L. (2019). The political economy of higher education finance: How information and design affect public preferences for tuition. *CESifo Working Paper*, 7536.
- Maniadis, Z., Tufano, F., and List, J. A. (2014). One swallow doesn't make a summer: New evidence on anchoring effects. *American Economic Review*, 104(1):277–90.
- Meslé, M. M. et al. (2023). Estimated number of lives directly saved by covid-19 vaccination programmes in the who european region from december, 2020, to march, 2023: A retrospective surveillance study. *The Lancet Respiratory Medicine*, 12(9):714–727.
- Miyachi, T., Takita, M., Senoo, Y., and Yamamoto, K. (2020). Lower trust in national government links to no history of vaccination. *The Lancet*, 395(10217):31–32.

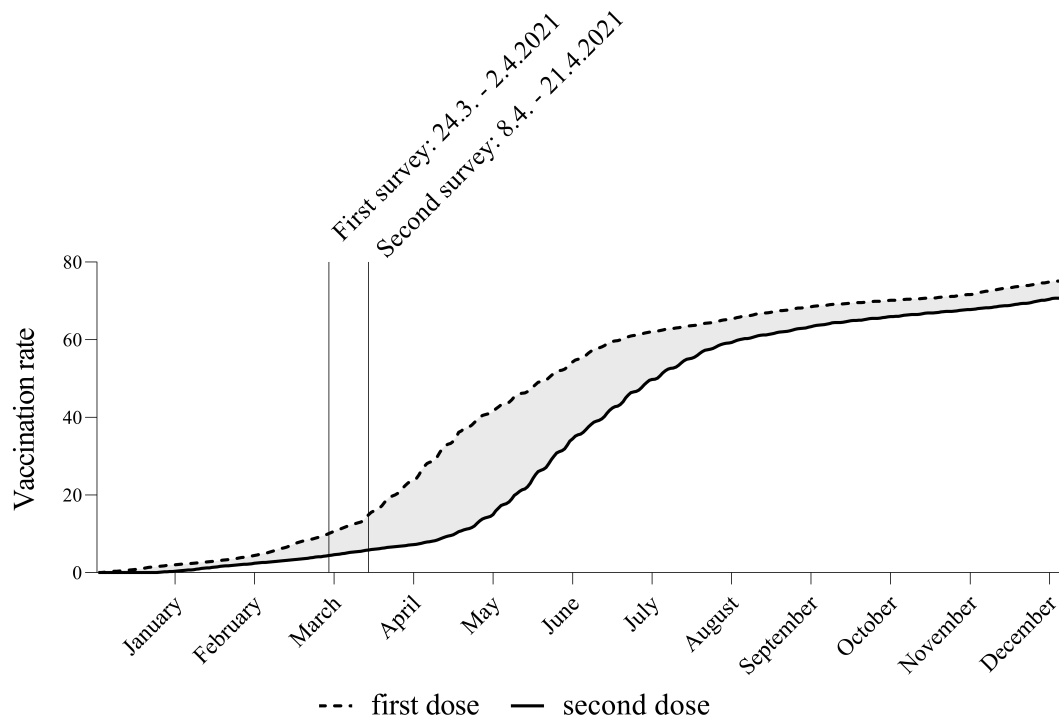
- Müller, S. and Rau, H. A. (2021). Economic preferences and compliance in the social stress test of the covid-19 crisis. *Journal of Public Economics*, 194:104322.
- Nuscheler, R. and Roeder, K. (2016). To vaccinate or to procrastinate? that is the prevention question. *Health economics*, 25(12):1560–1581.
- Oster, E. (2019). Unobservable selection and coefficient stability: Theory and evidence. *Journal of Business & Economic Statistics*, 37(2):187–204.
- Pereznieto, P. and Oehler, I. (2021). Social costs of the covid-19 pandemic. Report, The Independent Panel for Pandemic Preparedness and Response.
- Peyton, K., Huber, G. A., and Coppock, A. (2022). The generalizability of online experiments conducted during the covid-19 pandemic. *Journal of Experimental Political Science*, pages 1–16.
- Rieger, M. O. et al. (2020). Triggering altruism increases the willingness to get vaccinated against covid-19. *Social Health and Behavior*, 3(3):78.
- Robinson, E., Jones, A., Lesser, I., and Daly, M. (2021). International estimates of intended uptake and refusal of covid-19 vaccines: A rapid systematic review and meta-analysis of large nationally representative samples. *Vaccine*, 39(15):2024–2034.
- Serra-Garcia, M. and Szech, N. (2023). Incentives and defaults can increase covid-19 vaccine intentions and test demand. *Management Science*, 69(2):1037–1049.
- Stantcheva, S. (2022). How to run surveys: A guide to creating your identifying variation and revealing the invisible. *Annual Review of Economics*, 15(1):205–234.
- Steinert, J. I., Sternberg, H., Prince, H., Fasolo, B., Galizzi, M. M., Bütthe, T., and Veltri, G. A. (2022). Covid-19 vaccine hesitancy in eight european countries: Prevalence, determinants, and heterogeneity. *Science advances*, 8(17):eabm9825.
- Sutter, M., Kocher, M. G., Glätzle-Rützler, D., and Trautmann, S. T. (2013). Impatience and uncertainty: Experimental decisions predict adolescents' field behavior. *American Economic Review*, 103(1):510–31.
- Szmigiera, M. (2022). Impact of the coronavirus pandemic on the global economy - statistics & facts.
- Trueblood, J. S., Sussman, A. B., and O'Leary, D. (2022). The role of risk preferences in responses to messaging about covid-19 vaccine take-up. *Social Psychological and Personality Science*, 13(1):311–319.
- Tsutsui, Y., Benzion, U., and Shahrabani, S. (2012). Economic and behavioral factors in an individual's decision to take the influenza vaccination in japan. *The Journal of Socio-Economics*, 41(5):594–602.
- Van Der Pol, M., Hennessy, D., and Manns, B. (2017). The role of time and risk preferences in adherence to physician advice on health behavior change. *The European Journal of Health Economics*, 18(3):373–386.

Vieider, F. M., Chmura, T., Fisher, T., Kusakawa, T., Martinsson, P., Mattison Thompson, F., and Sunday, A. (2015). Within-versus between-country differences in risk attitudes: implications for cultural comparisons. *Theory and Decision*, 78(2):209–218.

Wake, A. D. (2021). The willingness to receive covid-19 vaccine and its associated factors: “vaccination refusal could prolong the war of this pandemic” –a systematic review. *Risk management and healthcare policy*, 14:2609.

Appendix A Additional Figures & Tables

Figure A1: Vaccination rates of the German adult population



Note: Source: [Bundesministerium für Gesundheit \(2022\)](#)

Table A1: Comparison of characteristics of our sample and official statistics

	<i>Sample</i>	<i>Microcensus</i>	<i>Difference</i>
	(1)	(2)	(3)
Age groups			
18-29	20.30	20.15	-0.15
30-39	18.72	19.17	0.45
40-49	18.54	18.10	-0.44
50-59	23.90	23.90	0.00
60-69	18.54	18.68	0.14
Gender			
Male	50.50	50.47	-0.03
Female	49.50	49.53	0.03
Highest school degree			
Basic	27.78	25.97	0.197
Middle	33.42	33.33	0.09
University entrance qualification ("Abitur")	38.80	40.00	-1.20
Country of residence			
Baden-Württemberg	13.50	13.37	0.13
Bayern	16.00	15.85	0.15
Berlin	4.43	4.45	-0.02
Brandenburg	2.98	3.05	-0.07
Bremen	0.77	0.81	-0.04
Hamburg	2.25	2.24	0.01
Hessen	7.57	7.58	-0.01
Mecklenburg-Vorpommern	1.87	1.93	-0.06
Niedersachsen	9.52	9.65	-0.13
Nordrhein-Westfalen	21.77	21.50	0.27
Rheinland-Pfalz	4.95	4.93	0.02
Saarland	1.18	1.18	0.00
Sachsen	4.71	4.84	-0.13
Sachsen-Anhalt	2.58	2.59	-0.01
Schleswig-Holstein	3.43	3.50	-0.07
Thüringen	2.50	2.52	-0.02

Note: This table shows participant characteristics of our final sample (n= 5,075) and the German Microcensus ([German Microcensus, 2015](#)). Our sample was drawn to match official population statistics concerning age, gender, educational background, and federal state. We ask participants "What is your highest general education degree?" and categorize them into three groups as follows: Basic ("No general school leaving certificate" and "Elementary school certificate"), Middle ("Secondary school certificate"), University entrance qualification ("Abitur") ("High school diploma" and "Advanced technical college certificate").

Table A2: Correlations between different trust measures

	<i>Trust Index</i>	<i>Trust in other people</i>	<i>Trust in the government</i>	<i>Trust in science</i>	<i>Trust in the COVID-19 vaccine</i>
Panel A: first survey					
Trust Index	1.000				
Trust in other people	0.667***	1.000			
Trust in the government	0.839***	0.365***	1.000		
Trust in science	0.789***	0.292***	0.530***	1.000	
Panel B: second survey					
Trust Index	1.000				
Trust in other people	0.656***	1.000			
Trust in the government	0.833***	0.338***	1.000		
Trust in science	0.812***	0.309***	0.550***	1.000	
Trust in the COVID-19 vaccine	0.505***	0.220***	0.461***	0.464***	1.000

Note: The table reports Spearman’s Rank correlation coefficients between various trust measures. We assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 "very low trust" to 4 "very high trust". We constructed an index (Trust Index) by calculating the arithmetic mean of these three trust-related questions. In the second survey, we additionally elicited trust in the COVID-19 vaccine by asking respondents their agreement with the statement: "I fully trust the COVID-19 vaccine. Agreements were measured on a 5-point scale ranging from [1] "I fully disagree" to [5] "I fully agree". To facilitate comparability, we standardize our measures using z-scores by subtracting the mean and dividing by the standard deviation.

We have 5072 observations, 2028 observations in the first, and 3044 in the second survey.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Summary statistics of supplementary survey (2023)

	<i>Mean</i>	<i>SD</i>	<i>Obs</i>
	(1)	(2)	(3)
Sociodemographics			
Female [%]	49.82	50.00	2180
Age in Years	43.80	14.50	2180
Born in Germany [%]	93.66	24.36	2178
Migration Background [%]	18.74	39.03	2177
Living in the East of Germany [%]	22.98	42.07	2180
Equivalentized household size	1.54	0.46	2176
Equivalentized household income [in Euros]	1,887	847	2018
University degree [%]	12.48	33.05	2180
Highest school degree [%]			
No degree/basic degree	1.01	10.00	2180
Middle school degree	57.39	49.45	2180
University entrance qualification	41.06	49.20	2180
Student	0.55	7.40	2180
Work status			
Currently working [%]	70.37	45.66	2177
Political party preferences [%]			
AfD	14.33	35.04	2177
CDU/CSU	15.71	36.39	2177
FDP	7.12	25.72	2177
SPD	14.61	35.32	2177
Die Linke	5.19	22.19	2177
Die Grünen	10.47	30.62	2177
Other/none Political Party	32.57	46.87	2177
Economic Preferences			
Risk-taking	4.50	2.45	2178
Patience	6.54	2.19	2178
Altruism	7.07	2.19	2178
Competitiveness	5.42	2.39	2178

Note: Column 1 (2) shows the mean values (standard deviations, SD) of the characteristics of our participants. Column 3 shows how many participants answered the corresponding questions. Equivalentized household size is a measure of household size using a standard (equivalence) scale, the modified OECD scale, which gives a weight of 1 to the first adult in the household, 0.5 to each other person in the household aged 14 years or older, and 0.3 to each child under the age of 14. Equivalentized household income corresponds to the reported household income divided by the equalized household size. Currently working is *one* if participants report being (self-)employed. Political party preference was elicited by asking which party participants generally sympathize with. Risk-taking, patience, altruism, and competitiveness were measured on 11-point scales.

Table A4: Association between intentions to vaccinate and economic preferences

	Intention to Vaccinate (ITV)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: first survey										
Altruism	0.154*** (0.036)	0.155*** (0.034)							-0.043 (0.034)	-0.044 (0.033)
Patience			0.341*** (0.034)	0.293*** (0.033)					0.165*** (0.035)	0.148*** (0.033)
Risk-taking					0.216*** (0.034)	0.178*** (0.033)			0.077** (0.031)	0.072** (0.031)
Trust Index							0.681*** (0.029)	0.633*** (0.029)	0.629*** (0.031)	0.592*** (0.031)
Panel B: second survey										
Altruism	0.077*** (0.027)	0.085*** (0.026)							-0.070** (0.028)	-0.059** (0.027)
Patience			0.258*** (0.027)	0.214*** (0.026)					0.156*** (0.028)	0.142*** (0.026)
Risk-taking					-0.027 (0.027)	-0.042 (0.026)			-0.083*** (0.024)	-0.065*** (0.024)
Trust Index							0.610*** (0.024)	0.548*** (0.024)	0.588*** (0.025)	0.530*** (0.025)
Covariates		✓		✓		✓		✓		✓
Difference between surveys										
Δ Altruism	0.076* (0.045)	0.070* (0.042)							0.028 (0.044)	0.016 (0.043)
Δ Patience			0.082* (0.044)	0.079* (0.042)					0.009 (0.044)	0.007 (0.042)
Δ Risk					0.243*** (0.043)	0.219*** (0.042)			0.160*** (0.040)	0.137*** (0.039)
Δ Trust							0.071* (0.037)	0.086** (0.038)	0.040 (0.040)	0.062 (0.040)
R-squared	0.010	0.140	0.045	0.162	0.013	0.139	0.198	0.279	0.211	0.289
Observations	5074	5074	5073	5073	5075	5075	5072	5072	5071	5071

Note: OLS regressions: Association between respondents' economic preferences and vaccination intentions (ITV) separately for the two surveys. The dependent variable (**Intention to Vaccinate (ITV)**) is a respondents' agreement with the statement: "I will get vaccinated against COVID-19 as soon as a vaccine is available for me.", measured on a 5-point scale (1 "I do not agree at all", 2 "I rather disagree", 3 "Neither", 4 "I rather agree", and 5 "I fully agree"). We transformed answers into a binary variable, coded as one if the respondent agreed with the statement (4 & 5) and zero otherwise. Economic Preferences: Altruism, patience, and risk-taking were measured on 11-point scales (0 "no agreement"; 10 "total agreement"). We assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 "very low trust" to 4 "very high trust". We constructed an index (Trust Index) by calculating the arithmetic mean of these three trust-related questions. To facilitate comparability, we standardize our measures using z-scores by subtracting the mean and dividing by the standard deviation. We control for respondents' additional background characteristics in uneven columns. Covariates: Female, age, born in Germany, living in East Germany, equalized household income, university degree, highest school degree (university entrance qualification), currently working, political party preferences (conservative), and a dummy indicating whether participants had already received a COVID-19 vaccination (see Table 1 for a description of these variables). Missing values of covariates are imputed. All regressions include imputation dummies.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Association between intentions to vaccinate and economic preferences (unvaccinated respondents)

	Intention to Vaccinate (ITV)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: first survey										
Altruism	0.159*** (0.037)	0.159*** (0.036)							-0.040 (0.035)	-0.048 (0.035)
Patience			0.345*** (0.035)	0.309*** (0.035)					0.159*** (0.036)	0.150*** (0.035)
Risk-taking					0.223*** (0.036)	0.190*** (0.036)			0.076** (0.033)	0.073** (0.033)
Trust Index							0.718*** (0.029)	0.688*** (0.030)	0.665*** (0.032)	0.646*** (0.032)
Panel B: second survey										
Altruism	0.087*** (0.030)	0.102*** (0.029)							-0.063** (0.030)	-0.055* (0.030)
Patience			0.283*** (0.030)	0.243*** (0.029)					0.170*** (0.031)	0.157*** (0.030)
Risk-taking					-0.025 (0.031)	-0.047 (0.031)			-0.082*** (0.027)	-0.070** (0.028)
Trust Index							0.654*** (0.026)	0.622*** (0.027)	0.626*** (0.027)	0.599*** (0.029)
Covariates		✓		✓		✓		✓		✓
Difference between surveys										
Δ Altruism	0.072 (0.048)	0.057 (0.047)							0.023 (0.047)	0.007 (0.047)
Δ Patience			0.061 (0.046)	0.066 (0.045)					-0.011 (0.047)	-0.007 (0.046)
Δ Risk					0.248*** (0.047)	0.237*** (0.047)			0.158*** (0.043)	0.143*** (0.043)
Δ Trust							0.064 (0.039)	0.066 (0.041)	0.040 (0.042)	0.047 (0.043)
R-squared	0.008	0.093	0.045	0.119	0.011	0.092	0.208	0.257	0.221	0.268
Observations	4454	4454	4453	4453	4455	4455	4452	4452	4451	4451

Note: For this table, we only consider respondents who had not yet received any COVID-19 vaccination. OLS regressions: Association between respondents' economic preferences and vaccination intentions (ITV) separately for the two surveys. The dependent variable (**Intention to Vaccinate (ITV)**) is a respondents' agreement with the statement: "I will get vaccinated against COVID-19 as soon as a vaccine is available for me.", measured on a 5-point scale (1 "I do not agree at all", 2 "I rather disagree", 3 "Neither", 4 "I rather agree", and 5 "I fully agree"). We transformed answers into a binary variable, coded as one if the respondent agreed with the statement (4 & 5) and zero otherwise. Economic Preferences: Altruism, patience, and risk-taking were measured on 11-point scales (0 "no agreement"; 10 "total agreement"). We assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 "very low trust" to 4 "very high trust". We constructed an index (Trust Index) by calculating the arithmetic mean of these three trust-related questions. To facilitate comparability, we standardize our measures using z-scores by subtracting the mean and dividing by the standard deviation. We control for respondents' additional background characteristics in uneven columns. Covariates: Female, age, born in Germany, living in East Germany, equivalized household income, university degree, highest school degree (university entrance qualification), currently working, political party preferences (conservative), and a dummy indicating whether participants had already received a COVID-19 vaccination (see [Table 1](#) for a description of these variables). Missing values of covariates are imputed. All regressions include imputation dummies.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A6: Association between intentions to vaccinate and economic preferences (attentive respondents)

	Intention to Vaccinate (ITV)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: first survey										
Altruism	0.094**	0.116***							-0.084**	-0.067*
	(0.045)	(0.042)							(0.040)	(0.039)
Patience			0.340***	0.296***					0.172***	0.158***
			(0.043)	(0.041)					(0.041)	(0.039)
Risk-taking					0.232***	0.192***			0.095**	0.087**
					(0.040)	(0.039)			(0.037)	(0.037)
Trust Index							0.721***	0.663***	0.674***	0.625***
							(0.034)	(0.034)	(0.036)	(0.036)
Panel B: second survey										
Altruism	0.040	0.063**							-0.088***	-0.068**
	(0.032)	(0.031)							(0.032)	(0.031)
Patience			0.242***	0.202***					0.135***	0.121***
			(0.033)	(0.031)					(0.032)	(0.031)
Risk-taking					-0.032	-0.044			-0.088***	-0.069**
					(0.032)	(0.031)			(0.029)	(0.028)
Trust Index							0.631***	0.575***	0.617***	0.563***
							(0.028)	(0.028)	(0.029)	(0.029)
Covariates		✓		✓		✓		✓		✓
Difference between surveys										
Δ Altruism	0.054	0.054							0.004	0.001
	(0.055)	(0.052)							(0.051)	(0.050)
Δ Patience			0.097*	0.094*					0.037	0.038
			(0.054)	(0.051)					(0.052)	(0.049)
Δ Risk					0.264***	0.236***			0.183***	0.156***
					(0.051)	(0.050)			(0.047)	(0.046)
Δ Trust							0.090**	0.088**	0.057	0.062
							(0.044)	(0.044)	(0.046)	(0.046)
R-squared	0.007	0.136	0.041	0.158	0.015	0.140	0.207	0.286	0.220	0.296
Observations	3707	3707	3706	3706	3708	3708	3705	3705	3704	3704

Note: For this table, we only consider respondents who passed an attention check. OLS regressions: Association between respondents' economic preferences and vaccination intentions (ITV) separately for the two surveys. The dependent variable (**Intention to Vaccinate (ITV)**) is a respondents' agreement with the statement: "I will get vaccinated against COVID-19 as soon as a vaccine is available for me.", measured on a 5-point scale (1 "I do not agree at all", 2 "I rather disagree", 3 "Neither", 4 "I rather agree", and 5 "I fully agree"). We transformed answers into a binary variable, coded as one if the respondent agreed with the statement (4 & 5) and zero otherwise. Economic Preferences: Altruism, patience, and risk-taking were measured on 11-point scales (0 "no agreement"; 10 "total agreement"). We assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 "very low trust" to 4 "very high trust". We constructed an index (Trust Index) by calculating the arithmetic mean of these three trust-related questions. To facilitate comparability, we standardize our measures using z-scores by subtracting the mean and dividing by the standard deviation. We control for respondents' additional background characteristics in uneven columns. Covariates: Female, age, born in Germany, living in East Germany, equivalized household income, university degree, highest school degree (university entrance qualification), currently working, political party preferences (conservative), and a dummy indicating whether participants had already received a COVID-19 vaccination (see Table 1 for a description of these variables). Missing values of covariates are imputed. All regressions include imputation dummies.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A7: Association between intentions to vaccinate and economic preferences (alternative ITV measure)

	Vaccination Readiness (ITV Index)									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Altruism	0.022*** (0.006)	0.026*** (0.006)							-0.013** (0.006)	-0.007 (0.006)
Patience			0.064*** (0.006)	0.052*** (0.006)					0.036*** (0.006)	0.031*** (0.006)
Risk-taking					0.003 (0.006)	-0.004 (0.006)			-0.010* (0.006)	-0.009* (0.005)
Trust Index							0.147*** (0.005)	0.128*** (0.006)	0.141*** (0.006)	0.123*** (0.006)
Covariates		✓		✓		✓		✓		✓
R-squared	0.004	0.154	0.036	0.170	0.000	0.148	0.194	0.278	0.204	0.285
Observations	3041	3041	3040	3040	3041	3041	3040	3040	3039	3039

Note: For this table, we only consider respondents from the second survey. OLS regressions: Association between respondents' economic preferences and vaccination readiness. The dependent variable (**Vaccination Readiness**) is a summary index, calculated as the arithmetic mean of five binary outcomes, measuring respondents' agreement with various statements: [1] "I will get vaccinated against COVID-19 as soon as a vaccine is available for me."; [2] "If I could choose the vaccine myself, I would get vaccinated against COVID-19 as soon as a vaccination is available for me."; [3] "If I had the chance, I would get vaccinated tomorrow with the AstraZeneca vaccine."; [4] "If I had the chance, I would get vaccinated tomorrow with the BioNTech and Pfizer vaccine.". Agreements were measured on a 5-point scale (1 "I do not agree at all", 2 "I rather disagree", 3 "Neither", 4 "I rather agree", and 5 "I fully agree"). We transformed these variables into binary variables, coded as one if the respondent agreed with the statement (4 & 5) and zero otherwise. Additionally, we elicited [5] whether respondents would like to receive a link for pre-registering for the COVID-19 vaccine at the end of the survey. They could simply answer with "Yes" or "No". The outcome variable is a summary index, calculated as the arithmetic mean of these 5 binary outcomes. Economic Preferences: Altruism, patience, and risk-taking were measured on 11-point scales (0 "no agreement"; 10 "total agreement"). We assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 "very low trust" to 4 "very high trust". We constructed an index (Trust Index) by calculating the arithmetic mean of these three trust-related questions. To facilitate comparability, we standardize our measures using z-scores by subtracting the mean and dividing by the standard deviation. We control for respondents' additional background characteristics in uneven columns. Covariates: Female, age, born in Germany, living in East Germany, equalized household income, university degree, highest school degree (university entrance qualification), currently working, political party preferences (conservative), and a dummy indicating whether participants had already received a COVID-19 vaccination (see Table 1 for a description of these variables). Missing values of covariates are imputed. All regressions include imputation dummies.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A8: Association between intentions to vaccinate and economic preferences (alternative trust measures)

	Intention to Vaccinate (ITV)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: first survey								
Altruism	-0.043 (0.034)	-0.044 (0.033)	-0.016 (0.038)	0.007 (0.037)	-0.003 (0.035)	-0.000 (0.034)	-0.003 (0.034)	-0.009 (0.033)
Patience	0.165*** (0.035)	0.148*** (0.033)	0.295*** (0.037)	0.253*** (0.036)	0.204*** (0.035)	0.176*** (0.033)	0.142*** (0.035)	0.127*** (0.033)
Risk-taking	0.077** (0.031)	0.072** (0.031)	0.131*** (0.034)	0.107*** (0.034)	0.122*** (0.031)	0.104*** (0.031)	0.102*** (0.031)	0.100*** (0.030)
Trust Index	0.629*** (0.031)	0.592*** (0.031)						
Trust Others			0.187*** (0.034)	0.141*** (0.032)				
Trust Government					0.534*** (0.032)	0.513*** (0.031)		
Trust Science							0.646*** (0.031)	0.608*** (0.030)
Panel B: second survey								
Altruism	-0.070** (0.028)	-0.059** (0.027)	-0.057* (0.030)	-0.019 (0.028)	-0.023 (0.028)	-0.011 (0.027)	-0.042 (0.028)	-0.036 (0.027)
Patience	0.156*** (0.028)	0.142*** (0.026)	0.265*** (0.030)	0.219*** (0.028)	0.179*** (0.028)	0.155*** (0.026)	0.154*** (0.029)	0.136*** (0.027)
Risk-taking	-0.083*** (0.024)	-0.065*** (0.024)	-0.093*** (0.027)	-0.089*** (0.026)	-0.055** (0.025)	-0.045* (0.024)	-0.061** (0.024)	-0.044* (0.024)
Trust Index	0.588*** (0.025)	0.530*** (0.025)						
Trust Others			0.196*** (0.027)	0.127*** (0.026)				
Trust Government					0.547*** (0.024)	0.496*** (0.024)		
Trust Science							0.563*** (0.026)	0.518*** (0.026)
Covariates		✓		✓		✓		✓
R-squared	0.211	0.289	0.067	0.174	0.185	0.274	0.209	0.291
Observations	5071	5071	5071	5071	5072	5072	5072	5072

Note: OLS regressions: Association between respondents' economic preferences, vaccination intentions (ITV), and different trust measures. The dependent variable (**Intention to Vaccinate (ITV)**) is a respondents' agreement with the statement: "I will get vaccinated against COVID-19 as soon as a vaccine is available for me.", measured on a 5-point scale (1 "I do not agree at all", 2 "I rather disagree", 3 "Neither", 4 "I rather agree", and 5 "I fully agree"). We transformed answers into a binary variable, coded as one if the respondent agreed with the statement (4 & 5) and zero otherwise. Economic Preferences: Altruism, patience, and risk-taking were measured on 11-point scales (0 "no agreement"; 10 "total agreement"). We assessed trust by asking respondents how much they trust (a) *other people*, (b) *the government*, and (c) *science*. Responses were recorded on a 4-point scale from 1 "very low trust" to 4 "very high trust". We constructed an index (Trust Index) by calculating the arithmetic mean of these three trust-related questions. To facilitate comparability, we standardize our measures using z-scores by subtracting the mean and dividing by the standard deviation. We control for respondents' additional background characteristics in uneven columns. Covariates: Female, age, born in Germany, living in East Germany, equalized household income, university degree, highest school degree (university entrance qualification), currently working, political party preferences (conservative), and a dummy indicating whether participants had already received a COVID-19 vaccination (see [Table 1](#) for a description of these variables). Missing values of covariates are imputed. All regressions include imputation dummies.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A9: Robustness: Selection on unobservables

	Altruism (1)	Patience (2)	Risk-taking (3)	Trust Index (4)
Panel A: first survey				
Controlled Coefficient	-0.044	0.148***	0.072**	0.592***
\tilde{R}			0.300	
R_{max}			0.390	
delta (δ)	-0.608	1.565	1.387	1.932
Panel B: second survey				
Controlled Coefficient	-0.059**	0.142***	-0.065***	0.530***
\tilde{R}			0.276	
R_{max}			0.359	
delta (δ)	-1.249	2.306	-5.803	2.141

Note: Test for selection on unobservables. We consider the regression model from [Table A4](#) (Column 10) and calculate an estimate of the degree of selection, δ , which would nullify the observed associations ($\alpha_1 = 0$) following [Oster \(2019\)](#).

Appendix B Additional Information

Vaccination rollout in Germany. The vaccination rollout in Germany started with the EU authorization of the mRNA vaccine Comirnaty from BioNTech on December 21, 2020, and the consecutive batch release for Germany by the Paul-Ehrlich-Institut, Federal Institute for Vaccines and Biomedicines, on December 22, 2020. The initial vaccination roll-out was relatively slow, increasing from 10% to 22% of the population during our field phase (from 24 March to 21 April 2021). By the end of 2021, almost 74% of the population received at least one dose of a COVID-19 vaccine. Appendix Figure A1 shows the development of vaccination rates in Germany from the start of the rollout until the end of January 2021. Due to supply shortages and logistical challenges, the rollout progressed only slowly until the end of March. At the start of our second survey on April 8, 2021, only a small proportion of 14.8% of the German population had been vaccinated at least once. These were mainly elderly people and health-care professionals who were prioritized based on the vaccine prioritization plan ([Bundesministerium für Gesundheit, 2022](#); [Bundesregierung, 2021](#)).

Polling details (first survey). Respondi sent a link to the survey to 11,252 adults, from which 9,653 (86%) opened the link. From those, 2,296 (24%) started the survey, and 2,182 (23%) finished it. Respondi adjusted both samples to match official population statistics by deleting 152 observations, which leaves a final sample of 2,030 respondents in the first survey. The median response time was 6:40 minutes.

Polling details (second survey). Respondi sent a link to the survey to 17,753 adults, from which 15,577 (88%) opened the link. From those, 3,685 (24%) started the survey, and 3,315 (21%) finished it. Respondi adjusted both samples to match official population statistics by deleting 270 observations, which leaves a final sample of 3,045 respondents in the second survey. The median response time was 14:00 minutes.

Respondents complete the survey online on their own digital devices, without any assistance from a surveyor.

Appendix C Online Surveys

C.1 First Survey

To start with, a couple of questions concerning you.

I am ...

- Female
- Male
- Diverse

When were you born?

Month: _____ Year: _____

What is your highest general education degree?

- No general school leaving certificate
- Elementary school certificate
- Secondary school certificate
- Advanced technical college certificate
- High school diploma
- I am currently a student

What professional training degree do you have?

Please tick all that apply.

- I do not have a professional training and am not in professional training.
- I have completed professional-in-company training (apprenticeship) or professional -school training (professional school, commercial school).
- I have completed training at a technical school, master craftsman school, technical school, professional- or technical academy.
- I have a polytechnic degree (e.g., diploma, bachelor, master).
- I have a university degree (e.g., diploma, state examination, bachelor, master).
- I have another professional degree.
- I am still in professional training (trainee, apprentice, professional-/ commercial school).
- I am a student.

In which state do you live?

[Dropdown with federal states]

[Introduction]

With this survey, we would like to learn more about the attitude of the population in Germany toward COVID-19 vaccination. In addition to questions on the topic of vaccination, we would like to ask you further questions about yourself towards the end of the questionnaire. If you do not wish to answer a question, please simply skip the corresponding questions. Answering the questionnaire will take about 10 minutes. Of course, the survey is anonymous and your answers will be treated with absolute confidentiality. The anonymized data set with the answers of all respondents will be made available to the scientific community after the survey for research purposes only. By clicking "Continue" below, you agree to this provision. No conclusions about your person can be drawn from the data.

We are simply interested in your spontaneous assessments and opinions. Your payoff is independent of your answers. Therefore, please always provide an answer if possible, even if you are a little unsure. The "Next" button will take you to the next question.

Thank you for your participation!

To what extent do you agree with the following statement?

"I will get vaccinated against COVID-19 as soon as a vaccine is available for me."

(If you have already been vaccinated, please put yourself in the situation as if you have not yet been vaccinated).

- I fully agree
- I rather agree
- I rather disagree
- I fully disagree
- Neither nor

To what extent do you agree with the following statement?

"People should get vaccinated against COVID-19 as soon as a vaccine is available."

- I fully agree
- I rather agree
- I rather disagree
- I fully disagree
- Neither nor

C.2 Second Survey

[Same questions (gender, age, schooling, professional training, and residence) as in the first survey.]

See previous section (Section C.1).

[Introduction]

With this survey, we would like to learn more about the attitude of the population in Germany toward COVID-19 vaccination. In addition to questions on the topic of vaccination, we would like to ask you further questions about yourself towards the end of the questionnaire. If you do not wish to answer a question, please simply skip the corresponding questions. Answering the questionnaire will take about 15 minutes. Of course, the survey is anonymous, and your answers will be treated with absolute confidentiality. The anonymized data set with the answers of all respondents will be made available to the scientific community after the survey for research purposes only. By clicking "Continue" below, you agree to this provision. No conclusions about your person can be drawn from the data. We are simply interested in your spontaneous assessments and opinions. Therefore, please always provide an answer if possible, even if you are a little unsure. The "Next" button will then take you to the next question. There are questions in the survey where you can earn an additional reward. The text of each question indicates the possibility and the amount of an additional payment. Any additional payment will be credited to you after the data has been analyzed within the next four weeks.

Thank you very much for your participation!

What do you estimate is the proportion of the population that needs to be vaccinated against the COVID-19 virus for non-vaccinated individuals to be protected ("herd immunity")?

_____ of 100 people need to be vaccinated.

How confident are you that your answer is approximately correct?

Very unconfident

Very confident

To what extent do you agree with the following statement?

"If I could choose the vaccine myself, I would get vaccinated against COVID-19 as soon as a vaccine is available for me."

(If you have already been vaccinated, please put yourself in the situation as if you have not yet been vaccinated).

- I fully agree
- I rather agree
- I rather disagree
- I fully disagree
- Neither nor

Now it's a question of how much a vaccination against COVID-19 would be worth to you: What is the most you would be willing to pay to be vaccinated tomorrow with the vaccine of your choice?

(State the most you would pay out of your own pocket if the vaccine were available for you to purchase. Please indicate "0" Euros if you do not want to be vaccinated with this vaccine. If you have already been vaccinated, please put yourself in the situation as if you have not yet been vaccinated.)

_____ Euro

And what is the most you would be willing to pay to have a person of your choice (not you) vaccinated against COVID-19 tomorrow with the vaccine of your choice?

State the maximum amount you would pay out of your own pocket if the vaccine were available for you to purchase. Please indicate "0" euro if you do not want a person of your choice to be vaccinated with this vaccine.)

_____ Euro

Would you like to receive a link to pre-register for a COVID-19 vaccination at the end of this survey?

- Yes
- No

[If "Yes" a pop-up appeared with the text: "*Thank you for your interest. At the end of the questionnaire, we will provide you with a link to find relevant pre-registration information in your state.*"]

Have you already pre-registered for the COVID-19 vaccination?

- Yes
- No

To what extent do you agree with the following statement?

"If I had the chance, tomorrow I would get..."

(If you have already been vaccinated, please put yourself in the situation as if you have not yet been vaccinated).

	I fully agree	I rather agree	I rather disagree	I fully disagree	Neither
... vaccinated with AstraZeneca's vaccine.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... vaccinated with BioNTech & Pfizer's vaccine.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To what extent do you agree with the following statement?

	I fully agree	I rather agree	I rather disagree	I fully disagree	Neither
I think most of my closest circle of relatives and friends are getting vaccinated against COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I think my closest circle of relatives and friends expect me to get vaccinated against COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Society expects me to get vaccinated against COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is better for me to get vaccinated against COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is better for my relatives and friends if I get vaccinated against COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is better for society if I get vaccinated against COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I fully trust the COVID-19 vaccine.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
All in all, I feel well-informed about the COVID-19 vaccine.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If many others get vaccinated, then I will get vaccinated as well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I would like to be vaccinated only after seeing that others have not experienced severe side effects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If many others get vaccinated, I do not need to be vaccinated as well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The expectations of my relatives and friends are important for my own vaccination decision.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am in favor of giving vaccinated people legal advantages (e.g., being allowed to go to restaurants or fly without testing).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am in favor of punishing individuals who refuse a COVID-19 vaccination (e.g., by restricting their freedom to travel or banning them from certain professions).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The COVID-19 vaccination should be mandatory for all.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I recommend that other people get vaccinated against COVID-19.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[End of experimental variation:]

It sometimes happens that survey participants do not read individual questions accurately. To ensure that you read the questions accurately, we ask you to ignore the following question and enter the number twenty-two in the text box.

The federal states are responsible for organizing vaccination against Corona. In how many states do you estimate that primary care physicians are already providing vaccination nationwide?

In _____ of the total of 16 federal states

[Cooperation-Gameⁱⁱ]

ⁱⁱ At this stage, we ran an incentivized one-shot Prisoner Dilemma game. For detailed instructions please refer to [Angerer et al. \(2024a\)](#).

Have you already been vaccinated against COVID-19?

- Yes, I have received at least one dose
- No

Have you already been infected with COVID-19?

- Yes, for sure
- Yes, I think so
- No, I don't think so
- No, definitely not

Do you have a profession in the health sector? (e.g. nurse, doctor, pharmacist)

- Yes
- No

[If "Yes" → [S2_q32f] What is your profession? - open answer question]

Do you practice a profession in a so-called system-relevant profession? (e.g., in a health profession incl. care of the elderly, at the public health department, at the police or fire department)

- Yes
- No

Do you think you belong to the group of people who are at increased risk for severe disease progression from COVID-19 disease?

- Yes, for sure
- Yes, I think so
- No, I don't think so
- No, definitely not
- I don't know

Do you have regular close contact with individuals who are at increased risk for severe disease progression from COVID-19 disease?

- Yes
- No

How do you rate yourself personally? Are you generally a risk-taker or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means "not at all willing to take risks" and the value 10 means "very willing to take risks". You can use the values in between to grade your assessment.

Not at all risky Very risky

Are you someone who is generally willing to give up something today to benefit from it in the future, or are you not willing to do so?

Please tick a box on the scale, where a value of 0 means "not at all willing" and a value of 10 means "very willing". You can use the values in between to grade your assessment.

Not at all Very

Are you someone who is generally willing to share with others without expecting anything in return, or are you unwilling to do so?

Please tick a box on the scale, where a value of 0 means "not at all willing" and a value of 10 means "very willing". You can use the values in between to grade your assessment.

Not at all Very

How much trust do you have...

	Very high trust	High trust	Little trust	No trust at all
... in other people?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... in the government?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
... in science?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Were you born in Germany?

- Yes
- No

Many people in Germany tend to vote for a particular political party in the long term, even if they occasionally vote for another party. Which party do you generally sympathize with?

- CDU or CSU
- SPD
- AfD
- FDP
- Die Linke
- Bündnis90/Die Grünen
- Another party, namely _____
- None

What is the best way to describe your acquisition situation?

- Pupil, trainee, student
- Full-time employed (incl. short-time work)
- Part-time employed (incl. short-time work)
- Self-employed
- Unemployed
- Househusband/housewife
- In retirement, pension or early retirement
- Other employment situation, namely _____

How many people currently live with you in a household - including yourself

_____ adults (18 years and older)
_____ children (under 18)

What is the total monthly net income of your household?

This means the sum resulting from wages, salary, income from self-employment, pension, or retirement pension, in each case after deduction of taxes and social security contributions. Please also include income from public assistance, income from renting, leasing, housing allowance, child benefit, and other income.

- below 400 Euro
- 400 until below 500 Euro
- 500 until below 750 Euro
- 750 until below 1.000 Euro
- 1.000 until below 1.250 Euro
- 1.250 until below 1.500 Euro
- 1.500 until below 1.750 Euro
- 1.750 until below 2.000 Euro
- 2.000 until below 2.250 Euro
- 2.250 until below 2.500 Euro
- 2.500 until below 2.750 Euro
- 2.750 until below 3.000 Euro
- 3.000 until below 3.250 Euro
- 3.250 until below 3.500 Euro
- 3.500 until below 3.750 Euro

- 3.750 until below 4.000 Euro
- 4.000 until below 5.000 Euro
- 5.000 Euro and more

What is the postal code of your place of residence?

What do you guess is the percentage of the adult population in Germany who agree with the following statement?

"I will get vaccinated against COVID-19 as soon as a vaccine is available for me."
 (If you have already been vaccinated, please put yourself in the situation as if you have not yet been vaccinated).

- I fully agree
- I rather agree
- I rather disagree
- I fully disagree
- Neither

_____ of 100 Germans agree "fully" or "rather" with the statement.

How confident are you that your answer is approximately correct?

Very unconfident Very confident

[only treated respondents who received information: S2_q37]: We gave you information on vaccination readiness from a previous survey at the beginning of the questionnaire, and that is that 70 out of 100 respondents agreed with the statement "I will get vaccinated against COVID-19 as soon as a vaccine is available for me."

How trustworthy did you find this information?

Very untrustworthy Very trustworthy

If you have any comments, criticisms, or suggestions for improvement regarding the survey, please use this text field.