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IZA DP No. 14833

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ABSTRACT

The COVID-19 Curtain: Can Past Communist Regimes Explain the Vaccination Divide in Europe?*

As of November 2021, all former Communist countries from Central and Eastern Europe exhibit lower vaccination rates than Western European countries. Can institutional inheritance explain, at least in part, this heterogeneity in vaccination decisions across Europe? To study this question we exploit novel data from the second wave of the SHARE (Survey of Health, Ageing, and Retirement in Europe) Covid-19 Survey fielded in Summer 2021 that covers 27 European countries and Israel. First, we document lower Covid-19 vaccine take-up amongst individuals above 55 years old who were born under Communism in Europe. Next, we turn to reunified Germany to get closer to a causal effect of exposure to Iron curtain regimes. We find that exposure to the Communist regime in East Germany decreases one's probability to get vaccinated against Covid-19 by 8 percentage points, increases that of not wanting the vaccine by 4 percentage points. Both effects are quite large and statistically significant, and they hold when controlling for individual socio-economic and demographic characteristics. We identify low social capital -measured as voluntary work, political engagement, trust in people- as a plausible channel through which past Communist regimes would still affect individuals' preferences for Covid-19 vaccination.

JEL Classification: I15, I12, P36, Z18

Keywords: Communism, vaccination, SHARELIFE, COVID-19

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1 Introduction

As of November 2021, the vaccine against Covid-19 is the most efficient way to protect oneself from the Coronavirus, and vaccine hesitancy the main barrier to reaching the sought-after herd immunization. Already in pre-Covid-19 time, reluctance to take vaccines was listed as one of the Top Threats to Global Health by the World Health Organization.[1] Although the Covid-19 vaccine has become available in all European Union (EU) countries at no cost for the population, some countries have been lagging in vaccination rates. While in Denmark, the Netherlands and Spain, more than 95% of the 50+ population had received their first jab by mid-July (see Fig. 1, authors' calculations using SHARE), Romania and Bulgaria had only vaccinated 28 and 22% of their 50+ population. To this day, all former Communist countries from Central and Eastern Europe (CEE) exhibit lower vaccination rates than Western European countries, occupying the last ten positions in terms of vaccination rates (all ages) in Europe (ECDC Vaccine Tracker on November 2, 2021)[2]. What are the determinants of these cross-country differences? Can institutions shape individuals' preferences for (non-) vaccination and explain some individuals' decision of not inoculating themselves with a vaccine many had been longing for? Can institutional inheritance explain, at least in part, the heterogeneity in vaccination decisions across Europe?

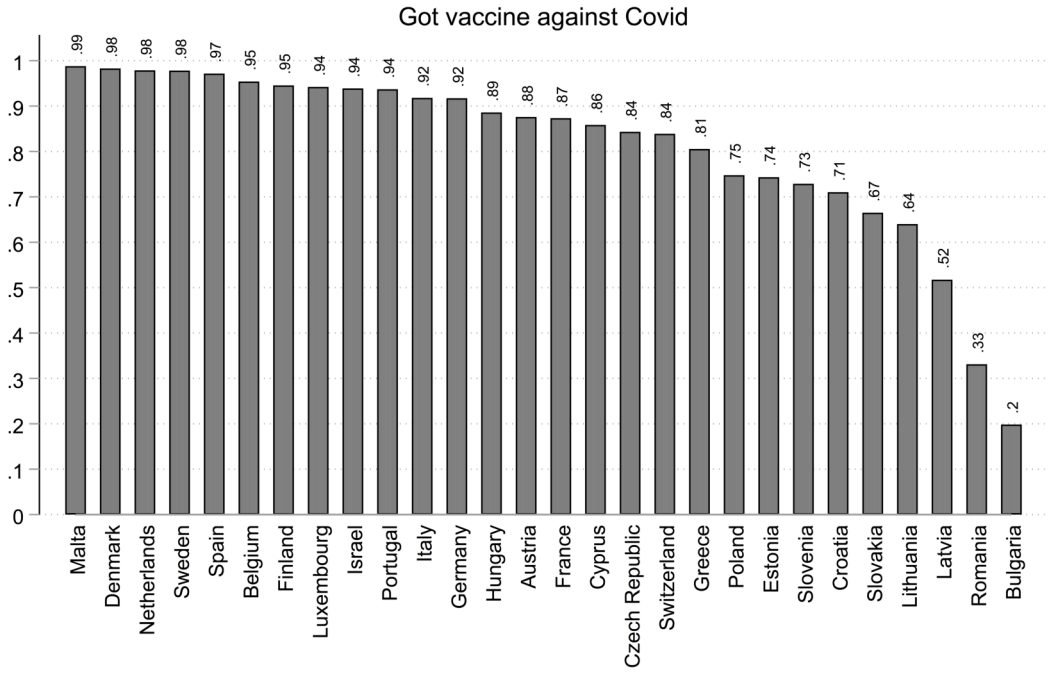

Fig. 1. Uptake of vaccine against Covid-19 across countries among 50+ in Summer 2021

Note: SHARE wave 2 COVID. Authors' own calculations based on survey weights and the country of residence.

[1] Refer to https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019

[2] Refer to https://vaccinetracker.ecdc.europa.eu/public/extensions/COVID-19/vaccine-tracker.html#uptake-tab

Our paper is the first to uncover a causal relationship between exposure to past Communist regimes and vaccination against Covid-19 (instead of intentions or attitudes towards vaccination). Assessing causality is a challenge, as Central and Eastern European and Western European countries differed in terms of history, culture, wealth, education levels, and most likely individual preferences before they were separated by the Iron curtain after the end of the Second World War (WWII). Exploiting the richness of our data, we can discard many potential drivers of vaccine (non-)uptake, such as lower education, better (or worse) health, lower socioeconomic status (SES), or unfavorable early-life conditions. Still, the Communist regimes were not randomly assigned to these countries and there were differences among them in the pre-communist era. To help us overcome this causality challenge, we exploit the quasi-natural experiment provided by the separation and later reunification of Eastern and Western Germany after WWII.

We use novel data from wave 2 Covid-19 of the Survey of Health, Ageing, and Retirement in Europe (SHARE) that was conducted in Summer 2021 across 27 European countries and Israel. The SHARE Covid-19 survey aims at studying the impact of the Covid-19 pandemic on individuals above 50 years old. Using external data sources about vaccination campaigns and the day of the interview of the SHARE Covid-19 Survey, we are able to discard the supply mechanism as the Covid-19 vaccine was universally available in the selected countries for individuals in this study. Next, we combine individual vaccination uptake data collected during the Covid-19 Survey, with residential history and early-life circumstances retrieved from SHARELIFE -conducted in 2007 or 2017- and education, health status, socio-demographic characteristics taken from the latest pre-pandemic longitudinal SHARE wave in which individuals participated.

We first show lower Covid-19 vaccine take-up amongst individuals born under a Communist regime in Europe. These results hold controlling for individual pre-pandemic health, socioeconomic characteristics, and current country of residence variables. In order to establish a more plausibly causal impact of former institutions on Covid-19 vaccine uptake, we switch to the reunified Germany setting.

In the case of Germany, we consistently find that individuals who were born in East Germany that had Communism for 40 years are less likely to get vaccinated against Covid-19 and more likely to report that they do not want the vaccine compared to their Western counterparts. These findings suggest the existence of a backlash effect of the past Communist regime on individuals' preferences for not getting the Covid-19 vaccine, as one could have expected individuals exposed to a collectivist culture and stricter vaccination campaigns to prioritize the health and survival of others, in comparison with potential safety concerns linked to the new vaccine, or aversion to State control. Likewise, when looking at other (less costly) preventive measures, such as hands washing, mask wearing or keeping distance, we also find that Eastern Germans comply less with them than Western Germans. The backlash is not total though: when it comes to the vaccine against influenza, which has been routinely inoculated to Germans for decades, prevalence is higher in East Germany.

Our results are subject to the following caveat regarding their interpretation: when finding significant differences between East and West Germany, we cannot know whether they are the result of individuals' exposure to decades of a Communist regime, or of individuals' exposure to

the fall of Communism, which led to one of the most severe crises in modern history for those people undergoing the transition. As a result, when referring to "exposure to Communism" or to "past Communist institutions", we put together the Communist and transition periods after 1990, and explore the consequences of both the rise and fall of Communism, on individuals' vaccination outcomes.

Through which channel do past institutions make the elderly reject a vaccine against a potentially deadly virus in pandemic times? We show individuals who were exposed to communism exhibit lower levels of social capital, measured as voluntary or charity work, political engagement, and trust in people (following Putnam, 1993; Glaeser, Laibson, Scheinkman, & Soutter, 2000; Conzo & Salustri, 2019). We find that some aspects of social capital, in turn, are positively associated with Covid-19 vaccination.

Our results go through several robustness checks. First, we show that low Covid-19 vaccination in East Germany is not driven by worse health, income or other omitted variables. Next, we show that treatment misassignment is unlikely in our case as results hold when defining East Germany on the basis not only on the region of birth, but also of the region of residence in 1945, 1989, or in 2017 (which we retrieve from individuals' retrospective residential history, in SHARELIFE). Then, we check that low vaccination does not result from a lower impact of the pandemic in East Germany.

When we generalize the results to all post-Communist countries, the negative association between Communism and Covid-19 vaccine take-up holds after adding controls for the current region of residence and restricting to Western European countries, meaning that the estimate is identified based on migrants from CEE.[3] Even though the sample of migrants is selective, this exercise is informative and suggests the persistence of the negative impact of post-Communist institutions regardless of the current place of residence.

Our paper is related to a large literature about the long-lasting causal impact of institutions on individuals' preferences and choices. In particular, we relate to a strand of the literature that investigates the role of past Communist institutions on present individuals' preferences. Starting with a seminal paper by Alesina and Fuchs-Schündeln (2007), many looked at the German division as a natural experiment. Related to Covid, Bluhm and Pinkovskiy (2021) exploit the longer mandatory Bacillus Calmette-Guerin (BCG) vaccination in East Germany before reunification to show the (in)effectiveness of BCG vaccine for the Covid-19 disease. We contribute to this literature by looking at *health* behaviors during uncertain times, specifically compliance with measures aimed at reducing contagion

From a methodological point of view, our paper is closer to Lippmann and Senik (2018) that also exploits variations across space. However, Becker, Mergele, and Woessmann (2020) recently argue that the comparison between East and West Germany should not be interpreted as a natural experiment because of differences which predate the Communist. Still, we believe that in our setting, and given our rich set of controls, these preexisting differences -related to political preferences, women's labor force participation, and protestantism- are unlikely to affect our results.

[3]Due to a small sample of movers from Eastern Germany to Western Germany in our data, we cannot perform the same exercise in the German setting. That is for Germany, 'born in East/West Germany' almost fully coincides with a dummy 'live in East/West Germany in 2017'.

Next, we directly contribute to the literature about the determinants of Covid-19 vaccination. Regarding the role of past institutions, previous studies on the relationship between Communism and the adoption of Covid-19 measures can be divided into two groups. The first group is based on aggregate data and consists of cross-country studies. Using a pre-Covid-19 Survey in 2018, Costa-Font, Garcia-Hombrados, and Nicińska (2021) shows that individuals from post-Communist countries have lower vaccination trust primarily due to the drop in governmental trust rather than interpersonal trust. We build on this paper by first looking at Post-communist countries too, but comparing two types of vaccines: the Covid-19 vaccine that was recently developed and old well-known vaccines such as the flu and pneumonia vaccines, and adding a rich set of individual characteristics like health, income, education, fertility, and marriage histories to reduce the omitted variable bias when discussing the impact and the mechanism. Second, we dive into the German setting to improve the identification strategy. The second group of studies is based on a cross-regional comparison of individual-level data in Germany. Based on an online survey in Fall 2020, Schmelz, Ziegelmeyer, et al. (2020) find that a mandatory vaccination could lead to differential responses depending on initial preferences.

As for other determinants of the Covid-19 vaccine not limited to institutions, previous studies have explored *attitudes* about vaccines (see Galasso et al., 2020; Lazarus et al., 2021; Karlsson et al., 2021). We add to this literature by looking at decisions, i.e. at revealed rather than stated preferences. Besides, we are able to look separately at two different yet commonly confounded concepts, i.e. vaccine hesitancy and vaccine refusal. Finally, we compare the results between Covid-19 and other well-known vaccines that previous studies often cannot do.

The draft proceeds as follows. Section 2 describes the context behind Covid-19 vaccination in Europe. Section 3 details the dataset and discusses the identification strategy. Sections 4 and 5 show the main findings and discussion. Section 6 concludes. External statistics and robustness checks can be found in the Appendix.

2 Covid-19 vaccine

This Section presents some contextual background on the Covid-19 vaccine in Europe: first, was it available in all countries when our data was collected, and were there enough doses in all countries, or did some countries suffer shortages that may explain lower vaccination rates? Were the 55+ (our target population) eligible to being administered a first dose in all countries at that time? Second, on top of availability and eligibility, did countries differ in other ways in terms of vaccination policies, e.g., types of vaccine, vaccine mandates, and others. We end this Section with discussion about the vaccination campaign in Germany.

2.1 Availability and eligibility

As stated by the European Center for Disease Control, "By January 2021, all 30 EU/EEA countries had started COVID-19 vaccination campaigns, and different COVID19 vaccine products have been gradually introduced as they became available through the EU Vaccines Strategy."[4]

[4]Refer to https://www.ecdc.europa.eu/sites/default/files/documents/Overview-of-the-implementation-of-COVID-19-vaccination-strategies-and-deployment-plans-23-Sep-2021.pdf

Due to the limited supply of vaccine doses at the start of the campaign, countries opted to prioritise those who were most at risk of severe disease, such as the elderly, those with comorbidities, or healthcare workers. Each country established its own calendar, defining phases, from 2 to 16 phases (only 1 in Israel), in order to ultimately reach the full coverage of the adult population. By June 2021, vaccines had been made widely available so that there were very few eligibility restrictions left.

To further check the availability of Covid-19 vaccines, we exploit the Oxford Covid-19 Government Response Tracker (OxCGRT).[5] Fig. A.1 shows several countries did not have universal vaccination coverage by mid-June. This is mostly due to age restrictions, which were the last ones to be lifted. Universal coverage of adult above age 50 had been reached for all countries over study by July 1st.[6]

Appendix B, Fig. B.1 shows the distribution of interview dates of the second wave of the SHARE Covid-19 survey by country. Although most interviews took place during July 2021 (the totality for Germany) and the beginning of August, some countries also ran interviews during the last two weeks of June. We address this potential source of cross-country heterogeneity in two ways: first, in all our specifications, we control for vaccine availability (as defined by the Oxford tracker), which varies with individuals' dates of interview and country of residence; second, we repeat our analysis restricting to respondents who completed the survey after July 1, 2021.

2.2 One common strategy

The EU adopted a common vaccines strategy with a view to securing supplies and facilitating their distribution. Through advance agreements with individual vaccine manufacturers, the EU Commission secured the right to buy a specified number of vaccine doses in a given timeframe and at a given price. Part of the objectives of the EU vaccines strategy was to ensure *equitable and affordable* access for all to an affordable vaccine as early as possible. As a result, all EU residents have been offered the right to a free vaccine, with no co-payment of any sort.

2.3 Not mandatory at the time of the interview

At the time of the survey, vaccination was not mandatory in any country, except in some cases for healthcare workers. Vaccine mandates such as the French "pass sanitaire" or the Italian "green pass" were not implemented until August 2021.[7] Moreover, we expect that for the elderly the vaccination requirements play less of a role as an incentive for vaccination relative to younger individuals.

[5]The OxCGRT contains daily information about the vaccination policies across countries. It takes values from zero to five, where five means universal availability. We match this vaccination availability index with the day and month of the interview for each respondent. Appendix A provides further details on the OxCGRT.

[6]Portugal and Spain, two countries with particularly high vaccination rates, had not opened yet to the less than 50, scoring 4 out of 5 on the Oxford tracker. Greece had similar age restrictions, but again, it did not apply to our 55+ sample, all of whom were eligible for their first jab across all the EU at that date.

[7]In some cases, for example, in France the proof of vaccination or the negative test was needed already in June to attend events in specific venues. However, it extended coverage only since August 9, 2021, refer to https://www.gouvernement.fr/info-coronavirus/pass-sanitaire.

For all these reasons, because the Covid-19 vaccine was available to our target population, in sufficient supply, free, and not mandatory, we discard the supply channel as a potential driver of cross-country heterogeneity in vaccine uptake, and treat vaccination outcomes as individuals' decisions in the remainder of the paper.

2.4 Vaccination campaign in Germany

Since in this study we focus in more details on Germany, we end this Section with a brief overview of the Covid-19 vaccination campaign there. Vaccination has officially started on December 27, 2020. During the first months, federal government was responsible for financing and distribution of vaccines to the vaccination centers. In turn, state governments (at the Länder level) ensured storage and distribution of doses in vaccination centers and mobile vaccination teams associated with vaccination centers[8]. The supply of vaccines was proportional to population in each state[9].

In Germany, the federal vaccination strategy consisted of three phases depending on the targeted population. During the first phase, vulnerable individuals, elderly above 80 or health workers, were eligible to get COVID-19 vaccine. The process of making appointments was organized at the state level. In particular, individuals needed to make an appointment online or by phone (in Baden-Wurttemberg, Bavaria, Brandenburg, Hesse, North Rhine-Westphalia, Rhineland-Palatinate, Saarland, Saxony, Saxony-Anhalt, Schleswig-Holstein, Thuringia) or were contacted directly with an invitation for vaccination by a letter (in Berlin, Mecklenburg Wester-Pomerania, Lower Saxony). Logistics problems and overwhelmed hotlines at the beginning of campaign were present in the country but not in a systematically different way across East and West Germany in the first phase.[10]

Since April 6, 2021, medical practices were involved in the vaccination campaign, and starting on June 7th, vaccination priority was lifted in Germany.[11] Even if supply and access to Covid-19 vaccine were not systematically different across Eastern and Western regions, still general practitioners and their attitudes towards Covid-19 vaccine might have differed as a long imprint from the past Communist institutions. In this case, differences in the vaccination rates among Eastern and Western Germans would reflect both intrinsic preferences of individuals but also differences in attitudes towards vaccine of their medical practitioners.

3 Data and empirical strategy

In this Section, first, we describe the SHARE data used in the study. Next, we discuss the identification strategy.

[8] Refer to https://ltccovid.org/2021/02/09/roll-out-of-sars-cov-2-vaccination-in-germany-how-it-started-how-it-is-going/amp/, https://www.zusammengegencorona.de/impfen/basiswissen-zum-impfen/die-nationale-impfstrategie/

[9] Refer to https://www.zusammengegencorona.de/impfen/basiswissen-zum-impfen/die-nationale-impfstrategie/

[10] Refer to https://www.zusammengegencorona.de/impfen/basiswissen-zum-impfen/die-nationale-impfstrategie/

[11] Refer to https://www.zusammengegencorona.de/impfen/basiswissen-zum-impfen/die-nationale-impfstrategie/

3.1 SHARE data

This study uses the Survey of Health, Ageing, and Retirement in Europe (SHARE), SHARELIFE, and the SHARE Corona Survey.[12] The SHARE provides socio-demographic and economic information about individuals above 50 years old in 27 European countries and Israel. It is a biannual longitudinal survey with the first wave in 2004. Below we explain how we merge different data modules to define the key variables in the study.

3.1.1 Wave 2 COVID

Since the beginning of the Covid-19 pandemic, two special Corona Surveys were conducted: wave 1 Covid-19 between June and August 2020; and wave 2 COVID between June and August 2021 to measure the impact of the Corona outbreak. Wave 2 COVID contains information about vaccination. We also supplement an analysis with wave 1 COVID when discussing the adoption of preventive measures, like keeping distance, mask wearing and hands washing during the first wave of the Covid-19 pandemic.

Each respondent in wave 2 COVID answers, *"Have you been vaccinated against Covid-19?"*.[13] 19 percent of respondents said *'No'*, and they received a follow-up question whether they have already had an appointment (1 percent), wanted to get vaccinated (3 percent), did not want to get vaccinated (8.5 percent), or were undecided (3.5 percent). Based on these two questions, we define our four outcome variables. For those who got the Covid-19 vaccine (1) we group 'already vaccinated' or 'made an appointment'. Then (2) we group 'got/had an appointment and want' as opposed to 'do not want or undecided', (3) 'do not want' as opposed to all other situations and (4) 'undecided' as opposed to all other situations.

We also analyze the general vaccination choices about longer-known vaccines: a flu vaccine, *"In the last 12 months, did you get a flu vaccination?"* and a pneumonia vaccine, *"Did you have a pneumonia vaccination within the last 6 years, that is a pneumococcal vaccine?"*. 61 (13) percent of individuals received the flu (pneumonia) vaccine. We use the flu vaccine as an additional outcome variable in main analysis when we compare the determinants of vaccination decisions. Results about pneumonia are similar, and we include them in Appendix K.[14]

Age, gender, and the day-month-year of the interview are taken from wave 2 COVID. Next, we exploit the longitudinal dimension of the SHARE to enrich information about individuals in the Corona survey.

3.1.2 Retrospective information

We retrieve early-life information from the SHARELIFE survey conducted in wave 3 (2007) or wave 7 (2017). SHARELIFE is a part of the SHARE data that aims to represent individuals'

[12]This publication is based on preliminary SHARE wave 9 COVID-19 Survey 2 release 0 data. For the full SHARE data use acknowledgments see the Appendix.

[13]The natural interpretation of the question implies getting at least one shot against Covid-19 rather than completing the full vaccine cycle when two shots are necessary. Anyway, our data do not allow us to distinguish formally these two cases.

[14]The distribution of pneumonia vaccines varies markedly across countries and rather reflects the difference in vaccination campaigns than decisions to get vaccinated. Still, our results about the flu vaccine are similar when we replace it with pneumonia.

life history from birth to the moment of the survey. Relevant to our study, we can build the residential history and define the country or region of residence each year.

First, we create an indicator for being born in a post-communist country. It is equal to one for all respondents born in the Czech Republic, Poland, Hungary, Slovenia, Estonia, Croatia, Lithuania, Bulgaria, Latvia, Romania, and Slovakia.[15] It is coded as 0 for Sweden, the Netherlands, Denmark, Finland, Belgium, Austria, France, Switzerland, Luxembourg, Israel, Spain, Italy, Greece, Portugal, Cyprus, and Malta. We leave out Germany in this exercise to make sure that results are not driven by it.[16] Next, we explain our approach for the choices of respondents from Germany.

In the case of Germany, due to country separation for almost 40 years, we consider a fine-grained regional variable - a NUTS 2 level - to define exposure to Communism. The 'Eastern Germany' indicator takes value one for all individuals born in Brandenburg, Mecklenburg-Western Pomerania, Saarland, Saxonia, Saxonia-Anhalt, and Thuringia. It is equal to zero if respondents were born in Baden-Wuerttemberg, Bavaria, Bremen, Hamburg, Hesse, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, and Schleswig-Holstein.[17] We leave out Berlin as we do not know if a respondent lived in the Eastern or Western part of the city.[18]

Next, we construct proxies for early-life socioeconomic status (SES): being vaccinated at age 16, four categories of self-reported health at age 10; three categories for chronic disease at age 10: none, 1 or more than 1; mental health disease at age 10, dummies for being a good student at math and at the language at age 10; five places of birth dummies: a big city, the suburbs of a big city, a large town, a small town or rural area; a dummy for having more than 25 books in the house at age 10; the number of services (e.g., hot running water supply, having a toilet inside the house and others); the household size at age 10; and living in a dwelling with more than two rooms, and 15 categories for mother's and father's education.[19]

3.1.3 Longitudinal information

Finally, we match individuals from the second wave of the SHARE COVID Survey with their answers in previous SHARE waves to create a set of current characteristics. First, we define seven educational ISCED-1997 categories and income quartiles defined at the country level before the pandemic. Regarding predetermined health, we include four categories for self-perceived health, the EURO-D depression scale (the sum of 12 symptoms of depression) and the number of chronic diseases (out of 13). To control for fertility and marriage history, we

[15] The name of the country is supposed to be its current name in case of change.

[16] The sample of those born outside of Europe is small, and we abstract from them in this analysis.

[17] Using the region of birth can potentially lead to a treatment misassignment problem; for example, the Eastern Germany dummy is equal to one for a respondent who was born in Saxonia in 1939 and then moved in 1942 to Bavaria. However, in our sample, few respondents moved between the Eastern-Western border from the moment of birth and 1950, the date Germany was divided. As a robustness check, we re-estimate the model defining an 'Eastern Germany' dummy based on the region of residence in 1950, 1989 or 2017. The results remain unchanged.

[18] As a robustness check, we also estimate the model defining an 'Eastern Germany' dummy based on the special module of SHARE data for the German sample which allows keeping Berlin as it asked about the region of residence in 1989. This adds 203 respondents to the German sample. The results remain unchanged.

[19] Regarding the quality of recalled data, previous studies based on wave 3 of SHARELIFE, Kesternich, Siflinger, Smith, and Winter (2014), Havari and Mazzonna (2015), and Havari and Peracchi (2017) argue that the data is unlikely affected by misreporting due to respondents' age at the moment of the survey.

include two indicators: having a child and living with a partner.

To measure social capital, we use three different proxies available in SHARE longitudinal questionnaires. The selected variables are in line with Conzo and Salustri (2019), who also used the SHARE data. First, we consider the question, *"Have you done voluntary or charity work in the last twelve months?"*. Next, we include a measure of trust in other people on a scale from 0 to 10, *"Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?"*. The third question is about political participation, *"Have you taken part in a political/ community-related organization in the last twelve months?"*. Finally, we combine all these variables and apply the polychoric principal component analysis (PCA) to create the aggregate measure of trust and reduce the dimensionality of our data. We perform PCA separately for all post-communist countries and Germany; in both cases, only one eigenvalue is greater than 1, and we use it in our analysis.

In total, our final sample includes 36,516 respondents who were born between 1916 and 1967 when we pool all European countries.[20] Restricting to Germany, we study 1,611 respondents. Tables D.1 and D.2 in Appendix D report the descriptive statistics of the variables used in the analysis of Est versus West Germany.

3.2 Empirical strategy

In the paper, we run two analyses. The sample of countries and individuals differ, but the main model is similar:

$$y_i = \alpha East_i + \beta X_i + \varepsilon_i \quad [1]$$

where y_i captures the vaccination decisions of an individual i. Baseline controls include constant, age, age squared, a female dummy, and the week of interview. We cluster standard errors at the year of birth and current region of residence level.[21],[22]

In the analysis based on several countries leaving out Germany, $East_i$ is equal to one if an individual was born in one of the 12 post-communist countries regardless of the current place of residence, and 0 - in the remaining 15 countries. The set of controls, X_i, additionally includes current country of residence specific characteristics: GDP per capita, population in January 2020, the cumulative number of Covid-19 infections and deaths due to Covid-19 by January 1, 2021, and the vaccination policy on the day of the interview from OxCGRT Tracker. When stated, additional specifications control further for current socio-demographic characteristics and early-life SES as defined in Section 3.1.

In the analysis based on Germany, $East_i$ is equal to one if an individual was born in one out of five Eastern German regions regardless of current region of residence, and 0 - in the remaining 10 regions in West Germany. Similar to the previous specification, when stated, we

[20] We restrict to respondents who are above 55 years old and not 50 due to a small sample size of respondents born between 1967 and 1971. The small sample is related to survey design and the lack of refreshment samples in the first wave of the SHARE COVID Survey in 2020 and the interruption of wave 8 in 2020. Still, when we also run the analysis for the 50+, our findings hold as the group between 50 and 55 does not significantly change our sample size.

[21] We derive this information from residential history. Region of residence often corresponds with NUTS 2. Still, the coding is different in a few countries, for example in Finland it corresponds with NUTS 3. In those cases we use available information, and cluster errors at the corresponding level.

[22] In the analysis we also tried specifications with the survey weights and results hold.

include additional controls for current socio-demographic characteristics and early-life SES.

When we broadly compare differences across countries, α captures associations between exposure to Communist institutions and vaccination decisions. We use these results as first suggestive evidence about the long-run impact of institutions but we are cautious that these countries already differed cultural and economic lines pre-Communism, and most importantly World War II had potentially affected differentially the two groups of country before the imposition of Communism. Accordingly, we next focus on Germany.

To get closer to a causal impact of Communism -or the fall of Communism- on vaccination choices, we assume that East and West Germany were similar before the separation according to the relevant outcomes in this study. This setting and identification strategy have been widely used by scholars starting with Alesina and Fuchs-Schündeln (2007).[23] In our case, the coefficient, α, captures the effect on the take-up of vaccines of exposure to the Communist regime and later reunification. A recent study by Becker et al. (2020) revisits the key identifying assumption in the Eastern and Western German comparison and suggests a careful interpretation of results because of a potential bias depending on the outcome due to differences in the pre-communist era between the newly assigned country borders. They show no pre-separation differences between East and West in income, GDP per capita, employment in health or domestic sectors. Still, we would like to acknowledge this limitation in our study as the church attendance was lower in East Germany, and if church attendance is treated as community interaction that can impact vaccination decisions, then our estimate can be interpreted as an upper bound of a true effect.

In Appendix E, we also present two alternative specifications that look into the length of individuals' exposure to the Communist regime, by replacing the 'Eastern Germany' indicator with the number of years a respondent has lived in Eastern Germany between 1949 and 1990 (and a categorical version of that variable: whether an individual has lived 0 years under Communism, 1 to 30 years, 30 to 39 years, or more than 39 years).

4 Results

In this Section we present our main results, first about all post-Communist countries and then looking at the East-West Germany comparison. First, we document how the post-Communist institutions impacted the decision to get the Covid-19 vaccine. To do so, we use two different dependent variables. In Column 1, the dependent variable is equal to one for the ones who got Covid-19 vaccine or made an appointment, and a reference group pools together respondents who want to be vaccinated, do not want to be vaccinated or are hesitant about it. Whereas for the second dependent variable, in Column 2, we add those who "want to get vaccinated" to individuals who already got vaccinated or have scheduled an appointment (this will be important in order to alliviate concerns about potential different vaccination campaigns or vaccine supply between regions). Columns 3 and 4 distinguish between being against Covid-19 vaccine and being undecided. Finally, in Column 5, we analyse the determinants of flu vaccine.

[23] We refer to Alesina & Fuchs-Schündeln, 2007; Lippmann & Senik, 2018; Lippmann, Georgieff, & Senik, 2020 for evidence about the similarity between East and West Germany before separation in 1945.

4.1 Evidence from Europe

We first look into how post-Communist institutions are related to vaccination outcomes in all European countries and Israel, excluding Germany. Table 1 shows that the probability of getting the Covid-19 vaccine drops by 22 percentage points (i.e. by 27 percent) for those born in a country that had Communism in the 20^{th} century (Columns 1 and 2). The magnitude of this estimate decreases but remains large and statistically significant, when controlling for individual socio-demographic and early-life characteristics and the evolution of the pandemic in a country (see *Panel II*). This dramatic drop in the vaccination rate is accompanied by an increase in vaccine refusal and hesitancy (Columns 3 and 4).

Table 1: Impact of post-Communist institutions on vaccination decisions

	COVID				Other
	Got	Got/Want	Do not want	Undecided	Flu
	(1)	(2)	(3)	(4)	(5)
Mean dep. var.	.819	.8487	.0849	.0646	.3815
SD dep. var.	.385	.3583	.2787	.2458	.4858
Panel I: main controls					
Post-Communist country	-0.220***	-0.209***	0.113***	0.0936***	-0.382***
	(0.00966)	(0.00885)	(0.00629)	(0.00539)	(0.0129)
R2	0.101	0.0892	0.0436	0.0429	0.161
N	36516	36516	36516	36516	36467
Panel II: controlling for current and early-life characteristics					
Post-Communist country	-0.134***	-0.121***	0.0548***	0.0629***	-0.208***
	(0.0148)	(0.0136)	(0.0108)	(0.00909)	(0.0226)
R2	0.0807	0.0652	0.0302	0.0409	0.163
N	20021	20021	20021	20021	19993

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for a constant, age, age squared, a female dummy, week of interview, GDP per capita, population in January 2020, the cumulative number of Covid-19 infections and deaths due to Covid-19 by January 1, 2021, and vaccination policy at the moment of the interview.

The decision of getting the Covid-19 vaccine could be motivated by the desire to protect oneself and the others from the virus regardless of potential side effects or concerns related to the novelty of this vaccine or fear of state control. On the other hand, the choice of getting a vaccine against a long-known disease -the flu shot- differs, and it is more likely to be subject to supply constraints, which was not the case for Covid-19. In our sample, respondents born in post-communist countries report a lower probability of getting the vaccine against flu than their counterparts from non-post-Communist countries. However, since the access to flu vaccine against influenza is not homogeneous across countries under analysis, and differences in the flu vaccine could be subject to national vaccination campaigns, economic situation, climate conditions, and others, we run two additional specifications. First, when we control for country of residence, meaning that the estimates are identified thanks to the sample of migrants from post-Communist countries, then the negative coefficient on the flu vaccine disappears (see *Panel a*, Table C.1, Appendix C). When we further restrict the sample to non-post Communist coun-

tries (still including country-of-residence fixed effects), meaning that the estimates are again identified thanks to the sample of migrants from post-Communist countries, the negative coefficient on the flu vaccine also disappears.[24] In contrast, the negative estimate on the Covid-19 vaccine remains significant in the two specifications (see *Panel b*, Table C.1, Appendix C). This is interesting as it fully controls for potential unobserved country-of-residence supply effects.

Again, even though we control for a rich set of individual characteristics, we cannot plausibly interpret our findings as a causal impact of exposure to Communism because of economical, cultural, and other pre-existing differences between those countries, before the Iron Curtain fell on Europe. Accordingly, we now turn to the analysis of Germany - to get closer to a causal impact of Communist institutions (and their disappearance) on vaccination.

4.2 Evidence from Germany

Most of the interviews in Germany were conducted at the beginning of July 2021, and by that time, the vaccination rate against Covid-19 had already reached 92 percent among individuals above 55 years old in our sample. In spite of such high compliance, the legacy of Communist institutions in East Germany decreases the probability of getting the Covid-19 vaccine by 8 percentage points for those born there (Column 1 in Table 2). These findings are not driven by common confounders like socio-demographic and early-life determinants. Moreover, when we add controls for the regional intensity of the pandemic, the same findings hold (Appendix H). We comment more on this in Section 5.2. In the case of Germany, being born in post-Communist regions increases the probability of refusing the Covid-19 vaccination.

Looking at the other vaccines, either flu or pneumonia, East Germans are more likely to take it. This result is different from the broad cross-country comparison, and likely related to the compulsory vaccination campaigns in the past. We comment more on this result in Section 5.3.

Next, we replace 'Eastern Germany' with years of exposure to Communism in Appendix E. Specifically, we define two new variables 1) the sum of years a respondent lived in Eastern Germany between 1949 and 1990, (*Panel a* in Table E.1), and 2) four categories (*Panel b* in Table E.1): 0 years under Communism, from 1 to 30 years (26 percent among the ones who were born in East Germany), from 30 to 39 years (31 percent among the ones who were born in East Germany) and more than 39 years (41 percent among the ones who were born in East Germany). Table E.1 shows that the impact on vaccination does not vary with years of exposure to Communism, which points at the importance of both living during the Communist regime and experiencing the transition period after it fell in 1990.

Finally, following Lippmann and Senik (2018) and Lippmann et al. (2020), we perform a permutation test by simulating the other divisions of the country by randomly assigning regions across East and West Germany. Our results are confirmed and the best model fit corresponds to when we assign regions correctly (see Table F.1 in Appendix F).

[24] In the main analysis, we control for GDP per capita, population in January 2020, the cumulative number of Covid-19 infections and deaths due to Covid-19 by January 1, 2021, and vaccination policy at the moment of the interview.

Table 2: Impact of post-Communist institutions on vaccination decisions in Germany

	COVID				Other
	Got	Got/Want	Do not want	Undecided	Flu
	(1)	(2)	(3)	(4)	(5)
Mean dep. var.	.9218	.941	.0422	.0155	.5513
SD dep. var.	.2686	.2356	.2011	.1236	.4975
Panel I: main controls					
Eastern Germany	-0.0769***	-0.0502***	0.0373**	0.0114	0.120***
	(0.0195)	(0.0168)	(0.0152)	(0.00756)	(0.0304)
R2	0.0449	0.0329	0.0204	0.0131	0.0420
N	1611	1611	1611	1611	1607
Panel II: controlling for current and early-life characteristics					
Eastern Germany	-0.0584***	-0.0299	0.0302*	-0.000300	0.132***
	(0.0224)	(0.0189)	(0.0174)	(0.00734)	(0.0363)
R2	0.104	0.0708	0.0800	0.0346	0.103
N	1406	1406	1406	1406	1404

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for a constant, age, age squared, a female dummy, week of interview.

5 Exploration of channels

In this Section, we first discuss potential confounders, and then describe plausible underlying mechanism behind our main findings.

5.1 Is lower Covid-19 vaccination in East Germany driven by predetermined health or other factors?

Decades of communism could have impacted individuals' health, in any of the two directions, as they came with a more equal but also impoverished society. A healthier population in East Germany might feel less at risk of severe illness due to Covid-19, and offer more resistance to vaccination. However, we find (see Table G.1 in Appendix G) older Eastern and Western Germans do not differ significantly in terms of objective measures of health, whether mental (EURO-D depression score), or physical (number of chronic diseases). There is a difference in subjective health, with those born in East Germany less likely to say their health is excellent, and more likely to say it is "fair" that is not supported by objective characteristics. Anyway, our findings hold controlling for this variable and for subjective health.

Moreover, as robustness checks, we also include controls for the frequency of praying (*'Thinking about the present, how often do you pray?'*), and political preferences (*'In politics people sometimes talk of left and right. On a scale from 0 to 10 where would you place yourself?'*), and our findings remain unchanged.

5.2 Are results affected by the differential impact of the Covid-19 pandemic?

A potential concern is that the low vaccination rate in East Germany can be related to a less severe impact of the pandemic there compared to West Germany. We address this concern in two different ways: first, we use external information from the Robert Koch Institute (RKI) about Covid-19 cases in each region in June 2020, after the first wave of the pandemic, and in January 2021, by the beginning of the vaccination campaign.[25] In line with Bluhm and Pinkovskiy (2021), we document that initially the Covid-19 pandemic had hit West Germany more severely than East Germany. Six months later though, the cumulative number of cases was higher in East than in West (see Table D.1, Appendix D). Moreover, Bluhm and Pinkovskiy (2021) further argue that state policies during the Covid-19 pandemic and access to medical services were similar across the country. To further rule out that Eastern Germans decide to take-up less Covid-19 vaccines because of fewer cases of Covid-19 during the first wave of the pandemic regardless of the later evolution of the pandemic, we repeat our main analysis adding controls for the number of Covid-19 at the region-of-residence level. Our main findings remain unchanged (see Table H.1, Appendix H).

Next, we exploit additional questions in the SHARE COVID survey, i.e. the probability of knowing someone who had Covid-19 symptoms or tested positive after the first wave of the pandemic and later by Summer 2021 (see Table H.2, Appendix H). Using self-reported information, we find consistent evidence that Eastern Germans were less likely to have been exposed to the virus by Summer 2020, but more likely so by Summer 2021. Again, our findings hold when we add these variables as controls.

5.3 Do Eastern Germans have a lower general exposure to vaccines?

Our results on East Germany getting less vaccinated than West Germany do not extend to more traditional vaccines such as the long-known vaccine against influenza, which was created in the 1940s.[26] Descriptive evidence on the former Communist countries could have led us to think the Covid-19 result was generalisable to all vaccines (see Table 1), but as mentioned earlier, the former Communist countries differed from Western countries before the introduction of communism, across too many dimensions, to take this at face value. Instead, focusing on reunified Germany allows us to discard a narrative based on ex- Communist countries simply being "vaccine sceptics". We find the opposite effect, as East Germany seems to get more flu shots than West Germany (see Table 2). This result is not surprising as East Germany has a long tradition of mandatory vaccination, as put forward in Bluhm and Pinkovskiy (2021), whose identification strategy is based on the differential BCG vaccination campaigns between East and West, with East Germany having continued mandatory vaccination for decades while West Germany had discontinued it in 1975. When we replace the vaccine against flu with the other long-known vaccine - against pneumonia - we still systematically find an increase in the vaccination in Eastern Germany (Columns 4-6 in Table K.1, Appendix K).

[25] Refer to https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Situationsberichte/Jan_2021/2021-01-02-en.pdf?__blob=publicationFile for on January 2, 2021, and https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/Situationsberichte/2020-06-01-en.pdf?__blob=publicationFil for June 1, 2020.

[26] Refer to https://www.cdc.gov/flu/pandemic-resources/pandemic-timeline-1930-and-beyond.htm

5.4 Social capital is lower in Eastern Germany

The success of any vaccination strategy relies on the share of individuals getting the vaccine. Herd immunity can only be reached once a sufficient share of the population has been exposed to the virus or is vaccinated. As such, vaccines -together with other strategies of contagion avoidance- create a positive externality, and can be seen as a public good.

Social capital, as the set of beliefs that promote cooperation and help to overcome the free-rider problem Guiso (2010), participates positively in the provision of public goods (e.g. Putnam, 1993; Herrmann, Thöni, & Gächter, 2008). We therefore investigate here whether lower social capital might be a channel through which past Communist institutions lead to lower Covid-19 vaccination.

Social capital is usually proxied in data by measures that involve some prosocial behavior, such as generalized trust (or some more specific measures of trust, towards government, authorities, etc.), the number of blood donations, newspaper readership (Durante, Guiso, & Gulino, 2021). Guriev and Melnikov (2016) exploit Google searches linked to prosocial behaviors such as "blood donations", "adopt a child", "orphanage", "charitable foundation", "help children", and "social protection". We follow closely Conzo and Salustri (2019) and look at three measures related to social capital: voluntary work, political participation, and generalized trust. All three measures are taken from the latest pre-pandemic wave, as we do not want them to be impacted by the Covid-19 context (Bargain & Aminjonov, 2020). Voluntary work -defined as whether an individual has taken part in the last 12 months into voluntary or charity work- has been commonly used in the literature as a proxy for other-regarding preferences and social capital (e.g. Putnam, 1993; Glaeser et al., 2000). Political participation is defined as whether an individual has taken part in the last 12 months to a political or community-related organization. Last, trust is measured as a linear variable from 0 to 10, recording how much "most people can be trusted or that one should be careful in dealing with people". We extract the first principal component (the only one with an eigenvalue superior to 1) out of these three measures and make it our social capital index. The first principal component explains 54 percent of the variation in the three variables, with the following scoring coefficients: 0.79 for voluntary work, 1.21 for political participation, and 0.38 for trust.

First, applying the same identification strategy as presented in Equation 1, we find that the past Communist regime, or the transition out of communism, has eroded individuals' social capital (Table 3). This finding echoes results from the EBRD Life in Transition Survey in 2006, which used 1,000 face-to-face interviews in each of the 28 post-communist countries, finding that the share of respondents who believed that most people could be trusted fell from 66 per cent before 1989 (measured retrospectively), to only about a third 17 years later. This result was consistent across all regions and countries, with most respondents across all age groups and income categories agreeing that people were generally "more trustworthy" under communism.

The same result holds for all three prosocial behaviors: Eastern Germans do less voluntary work, are less trusting of each other, and participate less in political organizations, than Western Germans (see Table I.1 in Appendix I). Our findings on social capital and vaccination are in line with Martinez-Bravo and Stegmann (2021), which finds a negative shock on trust led to decreased immunization rates in Pakistan.

Table 3: Impact of post-Communist institutions on social capital in Germany

	(1)	(2)
Dep. var.: first principal component of social capital		
Mean dep. var.	-.0076	.0143
SD dep. var.	.8159	.8133
Eastern Germany	-0.252***	-0.280***
	(0.0411)	(0.0453)
Current characteristics	No	Yes
Early-life characteristics	No	Yes
R2	0.0217	0.129
N	1610	1410

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, and the week of interview.

Going further, Table 4 shows that higher social capital in Germany is indeed associated with a higher probability to have taken the Covid-19 vaccine, and a lower probability to be against it.[27] Conversely, social capital does not seem to be related to the flu vaccine take-up, probably due to the fact that there is less a personal decision for a vaccine that has been existing for decades, especially in East Germany where our cohorts of individuals have all known mandatory vaccination, at least for diphtheria, tuberculosis, and smallpox (those who refused faced a fine). Looking separately at each of the social capital "proxies", it seems that voluntary work is the most pronounced one (see Table I.2 in Appendix I). It is also the one variable that has the strongest East-West gradient when looking at cross-country correlations, confirming a negative association between past Communism and the share of individuals doing voluntary work.

5.5 East Germans are less willing to comply with Covid-19 measures

If past communist institutions are linked to lower vaccination rates and more vaccine refusal through lower social capital, then we should also observe less compliance to the basic preventive measures that have been routinely recommended as a Covid-19 shield, in East Germany. We explore this hypothesis by looking at preventive behaviors in wave 1 and wave 2 of the SHARE COVID Survey. For the first wave, we use the five preventive measure variables that do not involve the company of others and use social distancing, cough covering, hands washing, sanitizer use and mask wearing. We follow Bertoni, Celidoni, Dal Bianco, and Weber (2021) and run a principal component analysis instead of looking separately at each type of preventive behavior, avoiding potential multiple hypothesis testing issues. We obtain two components with an eigenvalue above 1 that explains 71 percent of the total variance. For the second wave, we exploit the only two available variables that do not involve the company of others: social distancing and cough covering. As expected, Eastern Germans comply less with preventive measures, and this is true both in Summer 2020 and Summer 2021 (see Table J.1, Appendix J). Whether older

[27] These results hold when we replace the indicator of being born in Eastern Germany with region-of-birth fixed effects.

Table 4: Impact of social capital on vaccination decisions in Germany

	COVID				Other
	Got	Got/Want	Do not want	Undecided	Flu
	(1)	(2)	(3)	(4)	(5)
Panel I: main controls					
Social capital	0.0218***	0.0128*	-0.0124**	-0.00340	0.0243
	(0.00797)	(0.00693)	(0.00538)	(0.00338)	(0.0161)
R2	0.050	0.035	0.023	0.014	0.044
N	1605	1605	1605	1605	1601
Panel II: controlling for current and early-life characteristics					
Social capital	0.0154**	0.00768	-0.00859	-0.000281	0.0180
	(0.00766)	(0.00722)	(0.00594)	(0.00355)	(0.0180)
R2	0.11	0.072	0.081	0.035	0.10
N	1405	1405	1405	1405	1403

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, week of interview, and being born in Eastern Germany.

individuals protect themselves against COVID-19 is also positively related to their social capital score (see Table J.2, Appendix J): the greater their prosocial beliefs, the more they comply with preventive measures, in line with Durante et al. (2021), Bargain and Aminjonov (2020) and Egorov, Enikolopov, Makarin, and Petrova (2021).

6 Conclusion

All European countries succeeded in guaranteeing universal availability of the Covid-19 vaccine to their citizens. Yet, the vaccination rate varies significantly between Central and European countries, and Western countries. In order to reach herd immunization to return fast to a new normal, it is crucial to understand the determinants of vaccination decisions. Accordingly, is the divide between European countries in vaccination an imprint from former Communist institutions?

We exploit the novel COVID SHARE wave, which covers 27 European countries and Israel, to answer this research question. First, we show that post-Communist countries have a lower Covid-19 vaccination rate even after controlling for potential confounders. Next, to get closer to a causal estimate we switch to the quasi-natural experiment provided by the separation and later reunification of Germany. Regardless of the higher prevalence of the flu vaccination, we document the lower Covid-19 vaccination among 55+ among Eastern Germans. We show that one plausible mechanism behind the lower compliance with the Covid-19 vaccine, and more precisely behind refusal rather than just being undecided, is overall lower social capital in East Germany.

Our findings are relevant for policymakers to understand better reasons for non-compliance with Covid-19 policies and, as a result, to design vaccination campaigns depending on the target

audience. Moreover, this study emphasizes the role of social capital for the society that likely go beyond the Covid-19 pandemic and might apply for the usage of renewables and other green policies.

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Appendix "The COVID-19 Curtain: Can Past Communist Regimes Explain the Vaccination Divide in Europe?"

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This paper uses data from SHARE Waves 1, 2, 3, 4, 5, 6, 7 and 8 (DOIs: 10.6103/SHARE.w1.710, 10.6103/SHARE.w2.710, 10.6103/SHARE.w3.710, 10.6103/SHARE.w4.710, 10.6103/SHARE.w5.710, 10.6103/SHARE.w6.710, 10.6103/SHARE.w7.711, 10.6103/SHARE.w8.100, 10.6103/SHARE.w8ca.100, 10.6103/SHARE.w8caintd.100) and Börsch-Supan (2021c) and Börsch-Supan (2021b), see Börsch-Supan et al. (2013) and Scherpenzeel et al. (2020) for methodological details. The SHARE data collection has been funded by the European Commission through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARE-LIFE: CIT4-CT-2006-028812), FP7 (SHARE-PREP: GA N°211909, SHARE-LEAP: GA N°227822, SHARE M4: GA N°261982, DASISH: GA N°283646) and Horizon 2020 (SHARE-DEV3: GA N°676536, SHARE-COHESION: GA N°870628, SERISS: GA N°654221, SSHOC: GA N°823782) and by DG Employment, Social Affairs & Inclusion. Additional funding from the German Ministry of Education and Research, the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGHA_04-064, HHSN271201300071C) and from various national funding sources is gratefully acknowledged (see `www.share-project.org`). The datasets are Börsch-Supan, 2020a; Börsch-Supan, 2020b; Börsch-Supan, 2020c; Börsch-Supan, 2020d; Börsch-Supan, 2020e; Börsch-Supan, 2020f; Börsch-Supan, 2020g; Börsch-Supan, 2021a; Börsch-Supan, 2020a; Börsch-Supan (2020i); Börsch-Supan, 2020h.

A External statistics about vaccination

The Oxford Covid-19 Government Response Tracker (OxCGRT)[28] contains daily information about the vaccination policies across countries. We exploit variable h7 provided by the organizers. The h7 variable takes six potential values. If no vaccine was available, then it is equal to 0. To make the cross-country comparable value, the OxCGRT defines further three groups of individuals: key workers, clinically vulnerable groups and elderly, and depending on the number of groups the vaccine was available to, the vaccination policy is equal to 1, 2 or 3. For example, vaccination policy is equal to 1 if the vaccine is available to one group only, and 3 means it is available for all the listed categories. Next, it is equal to 4 if some further broad ages got the vaccine. And, finally, 5 means universal availability. Fig. A.1 shows changes in vaccination policies during Summer 2021.

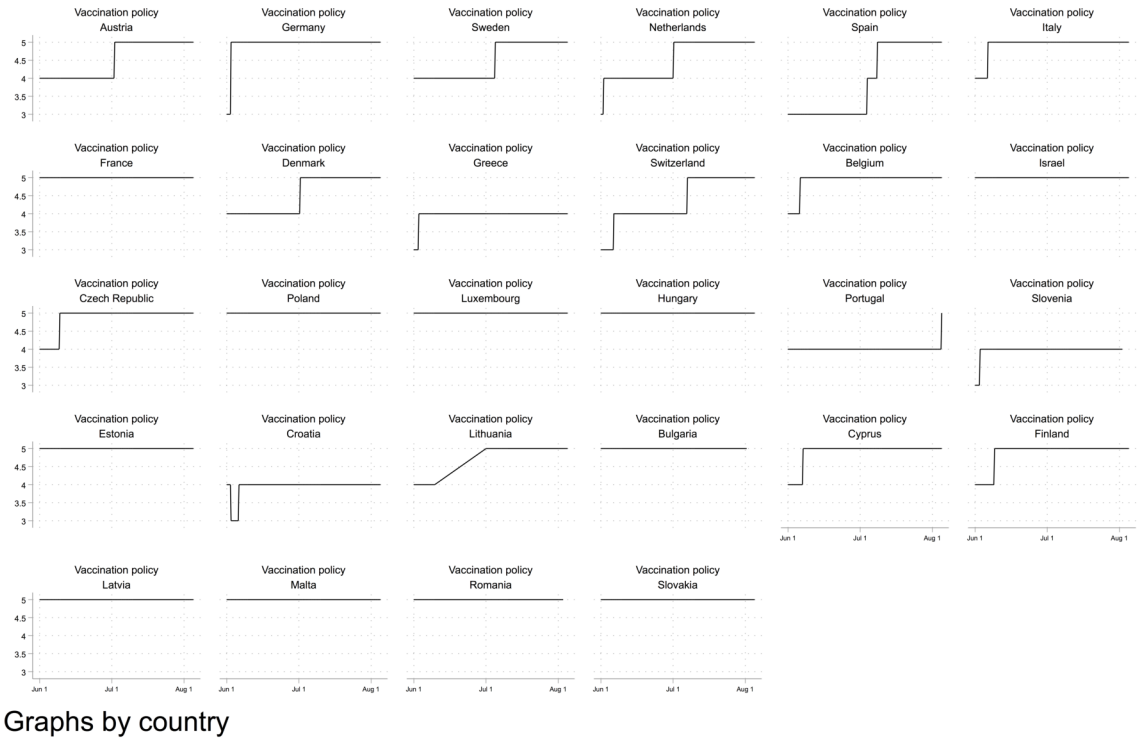

Fig. A.1. Eligibility to vaccine across countries between June 2021 and August 2021

Source: The Oxford Covid-19 Government Response Tracker (OxCGRT). The vaccine availability is coded as 3 if vaccine is available to key workers, clinically vulnerable groups and elderly; 4 if some further broad ages had includes; and 5 means universal availability.

[28] Refer to https://github.com/OxCGRT/covid-policy-tracker/blob/master/documentation/codebook.md

B Interview date in wave 2 COVID

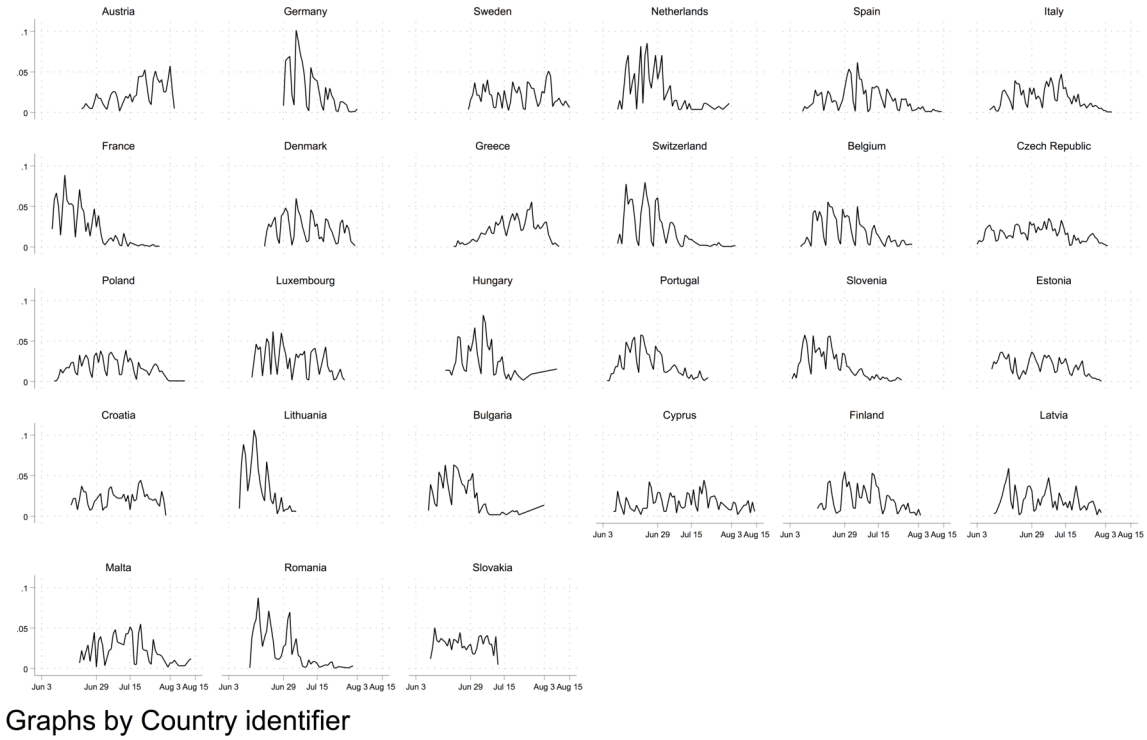

Fig. B.1. The interview date in wave 2 COVID

C All Europe and Israel excluding Germany

Table C.1: Impact of post-Communist institutions on vaccination decisions controlling for country of residence

	COVID				Other
	Got	Got/Want	Do not want	Undecided	Flu
	(1)	(2)	(3)	(4)	(5)
***Panel a*: All European countries now**:					
Mean dep. var.	.819	.8487	.0849	.0646	.3815
SD dep. var.	.385	.3583	.2787	.2458	.4858
Panel Ia: main controls					
Post-Communist country	-0.105***	-0.114***	0.0434*	0.0706***	-0.0247
	(0.0358)	(0.0329)	(0.0258)	(0.0239)	(0.0435)
R2	0.180	0.169	0.0911	0.0742	0.196
N	36516	36516	36516	36516	36467
Panel IIa: controlling for current and early-life characteristics					
Post-Communist country	-0.0945**	-0.0855**	0.0280	0.0570**	-0.0389
	(0.0390)	(0.0385)	(0.0298)	(0.0285)	(0.0511)
R2	0.0946	0.0778	0.0362	0.0478	0.188
N	20021	20021	20021	20021	19993
***Panel b*: Restricting to not post-Communist countries now**:					
Mean dep. var.	.9146	.9321	.0398	.0275	.5311
SD dep. var.	.2796	.2516	.1956	.1635	.499
Panel Ib: main controls					
Post-Communist country	-0.135***	-0.127***	0.0523	0.0758**	-0.0108
	(0.0471)	(0.0458)	(0.0336)	(0.0365)	(0.0544)
R2	0.0490	0.0428	0.0197	0.0289	0.116
N	20586	20586	20586	20586	20550
Panel IIb: controlling for current and early-life characteristics					
Post-Communist country	-0.0927*	-0.0906*	0.0314	0.0594	-0.0558
	(0.0557)	(0.0543)	(0.0382)	(0.0445)	(0.0606)
R2	0.0633	0.0543	0.0325	0.0288	0.158
N	13560	13560	13560	13560	13544

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, week of interview, country of residence fixed effects and vaccination policy at the moment of the interview.

D Descriptive statistics East and West Germany

Table D.1: Descriptive statistics among individuals born in East and West Germany

	West Germany	East Germany	Difference	(p-value)
	(1)	(2)	(3)	(4)
Outcome variables:				
Covid-19 vaccine:				
Got or scheduled	0.94	0.86	0.08	0.00
Got or scheduled or want	0.95	0.90	0.05	0.00
Want	0.01	0.04	-0.03	0.00
Do not want	0.03	0.07	-0.04	0.00
Undecided	0.01	0.02	-0.01	0.12
Other vaccines:				
Got flu vaccination	0.52	0.64	-0.12	0.00
Got pneumonia vaccine	0.30	0.38	-0.08	0.00
Potential mechanism:				
First component of social capital	0.06	-0.20	0.26	0.00
Voluntary work	0.32	0.18	0.14	0.00
Trust in others	5.60	5.28	0.32	0.02
Political engagement	0.08	0.05	0.04	0.01
Control variables:				
Age	70.54	70.35	0.19	0.69
Female	0.54	0.55	-0.02	0.57
Controls for current characteristics:				
Education:				
None	0.00	0.00	0.00	0.40
ISCED-97 code 1	0.00	0.00	-0.00	0.09
ISCED-97 code 2	0.10	0.02	0.08	0.00
ISCED-97 code 3	0.55	0.52	0.03	0.34
ISCED-97 code 4	0.05	0.03	0.02	0.08
ISCED-97 code 5	0.29	0.42	-0.13	0.00
ISCED-97 code 6	0.01	0.00	0.01	0.17
Missing	0.00	0.00	0.00	0.55
Having a child	0.84	0.92	-0.08	0.00
Living with a partner	0.76	0.72	0.04	0.10
Income:				
1st income quartile	0.16	0.22	-0.06	0.00
2nd income quartile	0.21	0.33	-0.12	0.00
3rd income quartile	0.27	0.27	-0.00	0.97
4th income quartile	0.36	0.17	0.18	0.00
Self-perceived health before pandemic:				
Good	0.45	0.45	0.01	0.78
Fair	0.26	0.34	-0.08	0.00
Poor	0.08	0.09	-0.01	0.49
Depression scale EURO-D	2.09	2.07	0.02	0.85
Number of chronic diseases	1.89	1.97	-0.08	0.39
Covid-related information:				
Covid-19 infections by Jan 1, 2021[a]	210.25	231.38	-21.14	0.00
Covid-19 infections by Jun 1, 2020[a]	24.18	13.55	10.63	0.00
Observations	1188	423		

[a] per 1.000.000

Table D.2: Descriptive statistics among individuals born in East and West Germany

	West Germany	East Germany	Difference	(p-value)
	(1)	(2)	(3)	(4)
Controls for early-life characteristics:				
Child's health: poor	0.01	0.01	0.00	0.45
Child's health: fair	0.11	0.10	0.02	0.32
Child's health: good	0.33	0.37	-0.05	0.07
Child's health: very good	0.55	0.52	0.03	0.36
Chronic disease during childhood	1.37	1.28	0.08	0.01
No chronic during childhood	0.07	0.08	-0.01	0.40
1 chronic during childhood	0.50	0.56	-0.06	0.03
>2 chronic during childhood	0.44	0.36	0.07	0.01
Mental problem during childhood	0.01	0.01	0.00	0.80
Vaccinated during childhood	0.99	1.00	-0.01	0.30
A bad student at math at age 10	0.68	0.66	0.02	0.42
A bad student at language at age 10	0.61	0.59	0.02	0.43
To be born in:				
A big city	0.22	0.13	0.08	0.00
The suburbs of a big city	0.04	0.02	0.02	0.04
A large town	0.07	0.10	-0.04	0.02
A small town	0.23	0.30	-0.07	0.00
A rural area	0.45	0.45	0.00	0.93
Household characteristics at age 10:				
>26 books	0.50	0.54	-0.04	0.13
No services of the individual's dwelling at age 10	0.05	0.11	-0.06	0.00
1 service of the individual's dwelling at age 10	0.17	0.30	-0.13	0.00
>1 services of the individual's dwelling at age 10	0.78	0.59	0.19	0.00
Household size at age 10	5.03	4.69	0.34	0.00
Number of number of individuals per room	1.32	1.45	-0.13	0.00
Additional controls are 15 categories for mother's and father's education				
Observations	1188	423		

E The length of exposure to Communism in East Germany

Table E.1: The length of exposure to Communism in Germany

	COVID				Other
	Got	Got/Want	Do not want	Undecided	Flu
	(1)	(2)	(3)	(4)	(5)
Mean dep. var.	.9218	.941	.0422	.0155	.5513
SD dep. var.	.2686	.2356	.2011	.1236	.4975
***Panel a*: Years of exposure to Communism**:					
Panel Ia: main controls					
Years under Communism	-0.00210***	-0.00129***	0.000986**	0.000269	0.00394***
	(0.000526)	(0.000451)	(0.000421)	(0.000191)	(0.000802)
R2	0.0442	0.0315	0.0197	0.0127	0.0463
N	1611	1611	1611	1611	1607
Panel IIa: controlling for current and early-life characteristics					
Years under Communism	-0.00190***	-0.00105*	0.00107**	-0.0000241	0.00411***
	(0.000626)	(0.000541)	(0.000515)	(0.000187)	(0.000958)
R2	0.107	0.0725	0.0825	0.0346	0.106
N	1406	1406	1406	1406	1404
***Panel b*: Four categories for the length of exposure**:					
Reference group: 0 years during Communism					:
Panel Ib: main controls					
From 1 to 30	-0.0568*	-0.0453	0.0312	0.00672	0.0874
	(0.0337)	(0.0350)	(0.0288)	(0.0137)	(0.0631)
From 30 to 39	-0.1000**	-0.0673**	0.0317	0.0369**	0.126**
	(0.0398)	(0.0290)	(0.0258)	(0.0171)	(0.0500)
More than 39	-0.0744***	-0.0406*	0.0467*	-0.00583*	0.151***
	(0.0262)	(0.0245)	(0.0247)	(0.00347)	(0.0395)
R2	0.0462	0.0335	0.0208	0.0183	0.0436
N	1611	1611	1611	1611	1607
Panel IIb: controlling for current and early-life characteristics					
From 1 to 30	-0.000102	0.0152	-0.00741	-0.00802	0.131**
	(0.0336)	(0.0283)	(0.0215)	(0.0118)	(0.0667)
From 30 to 39	-0.100**	-0.0620**	0.0387	0.0232	0.130**
	(0.0421)	(0.0276)	(0.0246)	(0.0162)	(0.0548)
More than 39	-0.0683**	-0.0382	0.0515*	-0.0131**	0.151***
	(0.0304)	(0.0289)	(0.0287)	(0.00555)	(0.0456)
R2	0.109	0.0754	0.0840	0.0392	0.104
N	1406	1406	1406	1406	1404

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, week of interview.

F Random assignment

Table F.1: Random assignment using the specification in Panel I (controls: age, age squared, gender and week on the interview)

	Got vaccine against Covid		
	10 %	5%	1%
	(1)	(2)	(3)
1 East regions in Group 1	0.530***	0.419***	0.248***
	(0.0166)	(0.0163)	(0.0142)
2 East regions in Group 1	0.511***	0.385***	0.208***
	(0.0155)	(0.0153)	(0.0133)
3 East regions in Group 1	0.660***	0.560***	0.373***
	(0.0253)	(0.0249)	(0.0217)
4 East regions in Group 1	0.900***	0.840***	0.680***
	(0.0760)	(0.0747)	(0.0652)
5 East regions in Group 1	1*	1*	1**
	(0.538)	(0.528)	(0.461)
R2	0.494	0.392	0.242
N	3003	3003	3003

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. This table tests all of the possible divisions of the 15 regions (10 in Western Germany and 5 in Eastern Germany) into two groups of respectively 5 (Group 1) and 10 (Group 2) regions. We derive the Eastern German estimate changing the composition of regions in Group 1 and Group 2. Then, we define a dummy that equals 1 if the coefficient associated with "East Germany" is statistically significant at the relevant thresholds. We regress this dummy on the number of Eastern German regions in Group 1 as an independent variable using Ordinary Least Squares. The omitted category is 0 Eastern German regions in Group 1. Column 1 displays the probability that the coefficients of interest are significant at the 10% level, column 2 at the 5% level, and column 3 at the 1% level. For instance, the cell in the 2nd column and 3rd row shows that with 3 Eastern German regions in Group 1 rather than zero, the probability that the coefficients of interest are statistically significant at the 5% level increases by 56.0 percentage points.

G Do health variables differ between Eastern and Western Germans?

Table G.1: Impact of post-Communist institutions on health before pandemic in Germany

		Self-reported health				
	Vaccinated during	Reference: Excellent			Depression scale	N. of chronic
	childhood	Good	Fair	Poor	EURO-D	diseases
	(1)	(2)	(3)	(4)	(5)	(6)
Mean dep. var.	.9913	.4524	.2785	.0817	2.0921	1.9084
SD dep. var.	.0929	.4979	.4484	.274	1.8817	1.625
Eastern Germany	0.00515	-0.00675	0.0828***	0.00921	-0.0511	0.0919
	(0.00406)	(0.0289)	(0.0252)	(0.0162)	(0.108)	(0.0870)
R2	0.00160	0.00445	0.0252	0.00980	0.0420	0.0535
N	1608	1616	1616	1616	1596	1616

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, and the week of interview.

H Were Eastern Germans less affected by the pandemic?

Table H.1: Impact of post-Communist institutions on vaccination decisions in Germany controlling for the number of cases

	COVID				Other
	Got	Got/Want	Do not want	Undecided	Flu
	(1)	(2)	(3)	(4)	(5)
Mean dep. var.	.922	.941	.0422	.0155	.5513
SD dep. var.	.2686	.2356	.2011	.1236	.4975
Panel I: main controls					
Eastern Germany	-0.0630***	-0.0566***	0.0440***	0.0108	0.0425
	(0.0219)	(0.0193)	(0.0169)	(0.00852)	(0.0386)
Covid-19 infections per 1.000.000 by Jan 1, 2021	-0.000380**	-0.000206	0.000141	0.0000983	0.0000708
	(0.000165)	(0.000141)	(0.000129)	(0.0000636)	(0.000262)
Covid-19 infections per 1.000.000 by Jun 1, 2020	0.000523	-0.00106	0.000952	0.000154	-0.00725***
	(0.00105)	(0.000924)	(0.000856)	(0.000441)	(0.00187)
R2	0.0504	0.0384	0.0248	0.0157	0.0539
N	1611	1611	1611	1611	1607
Panel II: controlling for current and early-life characteristics					
Eastern Germany	-0.0440*	-0.0368*	0.0354*	0.00256	0.0660
	(0.0232)	(0.0198)	(0.0181)	(0.00799)	(0.0450)
Covid-19 infections per 1.000.000 by Jan 1, 2021	-0.000346**	-0.000177	0.0000891	0.0000904	-0.000102
	(0.000161)	(0.000124)	(0.000114)	(0.0000579)	(0.000276)
Covid-19 infections per 1.000.000 by Jun 1, 2020	0.000523	-0.00117	0.000768	0.000529	-0.00697***
	(0.00105)	(0.000882)	(0.000703)	(0.000486)	(0.00202)
R2	0.109	0.0765	0.0826	0.0395	0.116
N	1406	1406	1406	1406	1404

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, week of interview.

Table H.2: Impact of post-Communist institutions on knowing someone who had Covid-19 by Summer 2021 in Germany

	Anyone ... in wave 2 Covid			Anyone ... in wave 1 Covid		
	had symptoms	tested positive	hospitalized	had symptoms	tested positive	hospitalized
	(1)	(2)	(3)	(4)	(5)	(6)
Mean dep. var.	.2857	.2884	.0952	.1004	.0745	.0257
SD dep. var.	.4519	.4531	.2936	.3006	.2626	.1583
Panel I: main controls						
Eastern Germany	0.0790***	0.0782***	0.0124	-0.0294**	-0.0277**	-0.00133
	(0.0278)	(0.0275)	(0.0191)	(0.0127)	(0.0115)	(0.00749)
R2	0.0199	0.0197	0.00295	0.0170	0.0100	0.00548
N	1610	1609	1607	2300	2296	2296
Panel II: controlling for current and early-life characteristics						
Eastern Germany	0.0790***	0.0782***	0.0124	-0.0294**	-0.0277**	-0.00133
	(0.0278)	(0.0275)	(0.0191)	(0.0127)	(0.0115)	(0.00749)
R2	0.0199	0.0197	0.00295	0.0170	0.0100	0.00548
N	1610	1609	1607	2300	2296	2296

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, week of interview. 'Had symptoms' in Columns 1 and 4 refers to Covid-19 symptoms.

I Social capital and vaccination

Table I.1: Impact of post-Communist institutions on social capital in Germany

	Voluntary work (1)	Trust in others (2)	Political engagement (3)
Mean dep. var.	.2831	5.513	.0719
SD dep. var.	.4507	2.3537	.2584
Panel I: main controls			
Eastern Germany	-0.137***	-0.320**	-0.0367***
	(0.0210)	(0.148)	(0.0126)
R2	0.0201	0.00457	0.0115
N	1614	1612	1614
Panel II: controlling for current and early-life characteristics			
Eastern Germany	-0.149***	-0.480***	-0.0280*
	(0.0259)	(0.159)	(0.0156)
R2	0.075	0.12	0.065
N	1410	1411	1410

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, and the week of interview.

Table I.2: Impact of social capital on vaccination decisions in Germany

	COVID				Other
	Got (1)	Got/Want (2)	Do not want (3)	Undecided (4)	Flu (5)
Reference group: Voluntary work					
Voluntary work	0.0398***	0.0257**	-0.0245**	-0.00589	0.0344
	(0.0130)	(0.0119)	(0.00948)	(0.00634)	(0.0278)
R2	0.049	0.035	0.023	0.014	0.043
N	1609	1609	1609	1609	1605
Variable: Trust in people from 0 to 10					
Trust in others	0.00448	0.00179	-0.00248	0.000472	0.000531
	(0.00322)	(0.00262)	(0.00231)	(0.00135)	(0.00574)
R2	0.047	0.034	0.021	0.013	0.042
N	1607	1607	1607	1607	1603
Reference group: No political engagement					
Political engagement	0.0167	0.0125	-0.00574	-0.0153***	0.0898**
	(0.0215)	(0.0186)	(0.0170)	(0.00346)	(0.0454)
R2	0.045	0.033	0.020	0.014	0.044
N	1609	1609	1609	1609	1605

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, the week of interview, and being born in Eastern Germany.

J Do Eastern and Western Germans adopt differently preventive measures?

Table J.1: Impact of post-Communist institutions on preventive behavior in Germany

	Preventive in w2 COVID		PCA of preventive in w1 COVID	
	Social distance	Cover cough	Component 1	Component 2
	(1)	(2)	(3)	(4)
Mean dep. var.	.9336	.8813	.0156	-.0241
SD dep. var.	.249	.3236	.9124	.7449
Panel I: main controls				
Eastern Germany	-0.0433***	-0.0313	-0.0864*	-0.0340
	(0.0150)	(0.0204)	(0.0519)	(0.0396)
R2	0.0227	0.0118	0.0237	0.00741
N	1567	1592	1601	1601
Panel II: controlling for current and early-life characteristics				
Eastern Germany	-0.0612***	-0.0340	-0.137**	-0.0353
	(0.0191)	(0.0225)	(0.0674)	(0.0465)
R2	0.064	0.044	0.080	0.062
N	1367	1389	1397	1397

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, week of interview. Social distance is an indicator that a respondent maintains distance always or often. Cover cough is an indicator that a respondent pays more attention in covering cough between wave 1 and wave 2 COVID. PCA preventive in wave 1 COVID is based on the frequency of mask wearing, keeping distance, wash hands, usage of sanitizer, and cough covering. First two components explain the 71% of variation.

Table J.2: Impact of trust on preventive behavior in Germany

	Preventive in w2 COVID		PCA of preventive in w1 COVID	
	Social distance	Cover cough	Component 1	Component 2
	(1)	(2)	(3)	(4)
Mean dep. var.	.934	.8808	.0176	-.0262
SD dep. var.	.2483	.3241	.9108	.7425
Panel I: main controls				
Social capital	0.00452	0.0165*	0.0974***	0.00445
	(0.00747)	(0.00995)	(0.0285)	(0.0226)
R2	0.0236	0.0136	0.0318	0.00769
N	1561	1586	1595	1595
Panel II: controlling for current and early-life characteristics				
Social capital	0.000200	0.00957	0.0626**	-0.00417
	(0.00878)	(0.0109)	(0.0303)	(0.0236)
R2	0.064	0.045	0.082	0.062
N	1366	1388	1396	1396

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. All specifications control for constant, age, age squared, female, week of interview, and being born in Eastern Germany. Social distance is an indicator that a respondent maintains distance always or often. Cover cough is an indicator that a respondent pays more attention in covering cough between wave 1 and wave 2 COVID.

K Is flu vaccine different from other long-known vaccines?

Table K.1: Impact of post-Communist institutions on vaccine against pneumonia

	All Europe and Israel excluding Germany			Germany		
	(1)	(2)	(3)	(4)	(5)	(6)
Mean dep. var.	.1157	.1371	.138	.3183	.3241	.3273
SD dep. var.	.3199	.3439	.3449	.466	.4682	.4694
Post-Communist country	-0.153***	-0.222***	-0.244***			
	(0.00891)	(0.0116)	(0.0171)			
Eastern Germany				0.0833***	0.0887***	0.100***
				(0.0262)	(0.0272)	(0.0314)
Main controls	yes	yes	yes	yes	yes	yes
Current characteristics	no	yes	yes	no	yes	yes
Early-life characteristics	no	no	yes	no	no	yes
R2	0.0773	0.0878	0.110	0.0466	0.0689	0.103
N	36279	26958	19904	1593	1552	1390

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. We cluster standard errors at year of birth - region of residence level. Main controls include constant, age, age squared, female, week of interview. Columns 1-3 control for GDP per capita, population in January 2020, the cumulative number of Covid-19 infections and deaths due to Covid-19by January 1, 2021, and vaccination policy at the moment of the interview.