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ABSTRACT: The Covid-19 vaccination campaign can be regarded as a public-sector success story. Given the shock caused by the pandemic, the visible and successful response of the public authorities regarding vaccination might have elicited an increase in the public's trust. We test whether the vaccination process has increased the marginal willingness to pay taxes (MWTP). Taking advantage of the different paths of vaccination in Spain, we pursue a difference-in-difference empirical strategy, complemented by an event study, to infer causality running from vaccination to MWTP. We find an increase in MWTP caused by the good governance related to vaccination.

JEL Codes: D72, H20, H26, H30
Keywords: Survey data, marginal willingness to pay, DiD, event study, Covid-19

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1. Introduction

The Covid-19 vaccination campaign can be regarded as a success story of contemporary societies and particularly of the public sector. On 17 June 2020, the European Commission (EC) issued a communication to the European Parliament that stated the following:[1]

> [T]o help protect people everywhere and EU citizens in particular, the Commission is proposing an EU strategy to accelerate the development, manufacturing and deployment of vaccines against Covid-19 (p. 1).

Barely six months later, EC member states received their first doses of the Pfizer vaccine. More specifically, the first shipment arrived in Spain on 26 December 2020.[2]

Within a very short period, therefore, the development, manufacture and deployment of vaccines was achieved, and the final output – the availability of vaccines – was very visible to society.[3] The delivery process to member states was managed by the EC. From that point, however, it was the turn of each member state to design and implement its own domestic vaccination strategy.[4] In Spain, the purpose of the strategy – whose design lay in the hands of the Interterritorial Council of the National Health System (in Spanish initials, CISNS), a collegiate healthcare body that draws on the participation of the leading health officials in the autonomous communities and the Spanish Minister for Health – was to reduce the morbidity and mortality caused by the disease through vaccination, in a context of progressive availability of doses, while protecting the most vulnerable groups.[5] The effectiveness of the vaccines, the high vaccination willingness of Spanish society and the sound implementation of the designed strategy (which included spaces for mass vaccination, advertising campaigns, and overtime for healthcare

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0245&from=EN

[2] https://www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/sanidad14/Paginas/2020/261220-llegada-primeras-vacunas-a-espana-contra-co.aspx

[3] See, for example, https://elpais.com/sociedad/2020-12-27/araceli-hidalgo-96-anos-primera-vacunada-de-covid-en-espana-a-ver-si-conseguimos-que-el-virus-se-vaya.html

[4] https://www.sanidad.gob.es/gabinetePrensa/notaPrensa/pdf/24.11241120144436287.pdf

[5] It is striking how societies and the role of the public sector have changed in a century. Between 1918 and 1920, Spain, like many other countries, was hit by the so-called Spanish flu, which infected 8 million people and claimed more than 300,000 lives in the country. However, none of the most influential Spanish politicians in power at the time even mentions the pandemic in their political memoirs (Riquer, 2022).

personnel) helped to achieve good results (see, for example, Antonini et al., 2022).[6]

Our hypothesis is that, given the shock caused by the pandemic, the visible and successful response of the public authorities regarding vaccination might have elicited an increase in the public's trust. This, in and of itself, could be a welcome result, a kind of double dividend, given the tendency of individuals to engage in free riding with respect to the provision of public goods. Fehr (2009) proposes a behavioural definition of trust that has two elements. On the one hand, the individual who trusts (in our case, the taxpayer) places resources at the disposal of another party (the public sector), but without the means to guarantee that they will be returned. On the other hand, there is simply an expectation that the act of trust will be of direct benefit to them. While taxes certainly do not convey a direct individual benefit, good governance related to the vaccination process might have increased expectations of better public sector performance in the future.[7] Indeed, this might prove to be good news, confirming other empirical evidence pointing to an increase in institutional trust arising from good public governance (Van de Walle and Migchelbrink, 2022).[8]

Within the context of taxation, Slemrod's (2002) definition of trust focuses on the second part of Fehr's definition, concluding that trust is close to approval. Accordingly, this view would be consistent with an increasing marginal willingness to pay taxes (MWTP) (see also Oh and Hong, 2012), that is, with an increase in the predisposition of taxpayers to contribute to the common good. We think this is important as "[one] challenge (…) is to identify aspects of government expenditure and tax policies that mediate the free-rider impulse in an empirically important way" (Slemrod, 2002, p. 6). That proposition is the aim of the present paper, namely, to test whether the vaccination process – through an increase in institutional trust – has mediated the free-rider problem and therefore increased MWTP.[9] In a similar vein, Lachapelle et al. (2021) test whether in the general

[6] By the beginning of 2023, 92.6% of the population older than 12 years had received all of the vaccine doses recommended by the public authorities. See also https://www.euronews.com/my-europe/2021/09/03/how-struggling-spain-became-one-of-europe-s-vaccination-champions

[7] One important characteristic of the vaccination process that enhances the chances of increasing trust is the visibility of the whole process (Bouckaert, 2012, p. 105), including the final stage through mass vaccination spaces.

[8] See also Murtin et al. (2018), Figure 6.3 (p. 44).

[9] Certainly, there could also be an increasing demand for a "different type of state: one that is able to act as an investor of first resort, catalysing new types of growth and, in so doing, crowd in private-sector

context of Covid-19, people are willing to pay, in their case, earmarked taxes;[10] in their setting, the hypothesis is based on the existence of generalised social trust rather than institutional trust. They find little evidence of increased MWTP even in a pandemic context.

Taking advantage of the different paths of vaccination in Spain, we pursue a difference-in-difference empirical strategy to infer causality running from vaccination to MWTP. We find that a good governance related to vaccination implied an increase in MWTP.

The rest of the paper is organised as follows. Section 2 describes the survey data used in the empirical strategy and the logistics of vaccination in Spain, while section 3 presents the empirical strategy itself. Subsequently, section 4 sets out the main results and section 5 offers up conclusions.

2. Survey data and vaccination path in Spain

To test our hypothesis, we employ survey data. As Table 1 shows, we have four waves at our disposal. The first one took place in May 2020 during the official lockdown ordered by the Spanish government because of Covid-19. The lockdown ran from 13 March to 25 June 2020. The three subsequent waves were conducted every six months from then on. Each wave was conducted online, and it was monitored and processed by a professional survey firm, *Netquest*, which has a broad, high-quality panel of potential respondents.[11] Participation was by invitation only and any participants in one wave were excluded from the rest. The survey contains an item about sincerity in responding and a quality check item to ensure respondents' attention. Moreover, any responses where the time of response was 20% faster than expected have been dropped from the sample. Respondents were over the age of 18, resided in Spain, and were rewarded through a programme of in-

investment and innovation – these are in essence functions about expectations about future growth areas" (Mazzucato and Kattel, 2020, p. 2). This demand, thus, could certainly be compatible with a large-scale public sector, which is the focus of the current piece of research. See also Rota-Graziosi and Arezki (2021).

[10] Their analysis is also based on a survey, and the survey question is: "If the federal government were to propose imposing a new tax to fund massive spending to [revive Canada's economy/fight the spread of Covid-19 (coronavirus)], to what extent would you agree or disagree with supporting this policy [if the tax represented 1% / 2% / 5% / 10% of your current income]?" Hence, the tax revenue could be "hypothecated" for stabilisation purposes or for public health issues, depending on the random sample.

[11] https://www.netquest.com/en/online-surveys-investigation

kind compensation.

Table 1. Waves of the survey and vaccination campaign.

Wave	Number of responses	Date	Vaccination campaign in progress
1	2,003	20-26 May 2020	NO
2	2,024	20-25 November 2020	NO
3	2,001	26 May to 7 June 2021	YES
4	*2,409*	*3-9 December 2021*	*YES*

We code the variable MWTP from the survey question that reads as follows:

> Some people think that public services and social benefits should be improved, although this implies higher taxes (group 1). Others think it is more important to pay less taxes, although this implies a lower level of public services and social benefits (group 2). Others consider that the current level of taxes and of public services and social benefits is adequate (group 3). Which group is closer to your preferences?[12]

MWTP = -1 (for those self-selected in group 2); 0 (for group 3); and for those self-selected within group 1, there was an additional question that allowed us to code MWTP = +1 (they are willing to pay up to an additional 5% of their annual income), +2 (between 6% and 10% of their annual income), and +3 (more than 10% of their annual income). Thus, MWTP is a discrete variable running from a negative predisposition to pay taxes (-1) to a maximum one (+3).

The question is provided to a subsample of every wave, which is 20% of all surveyed population. In particular, it contains all the representative ages of Spanish population, which goes from 18 to 87 years old.

The Covid-19 vaccination campaign in Spain was launched in December 2020, only days after the European Medicines Agency (EMA) authorised the first vaccine. The first doses were distributed among the most vulnerable groups of citizens in line with an official vaccination strategy approved by a technical team within the CISNS, which followed and

[12] In Spanish, "*Algunas personas piensan que deberían mejorarse los servicios públicos y las prestaciones sociales, aunque haya que pagar más impuestos (grupo 1). Otras piensan que es más importante pagar menos impuestos, aunque eso signifique reducir los servicios públicos y prestaciones sociales (grupo 2). Otras consideran que ya está bien el nivel actual de impuestos y de servicios públicos y prestaciones sociales (grupo 3) ¿En qué grupo te situarías?*"

regularly updated the strategy in the following weeks. On 18 December 2020, they agreed to start vaccination with the residents and personnel working in retirement homes, front-line healthcare workers and highly dependent people. On 21 January 2021, seniors aged 80 and older were added. On 9 February, members of the security forces and schoolteachers joined. On 26 February, other groups were launched, e.g. 70-79 years, 60-69 years, or people younger than 60 but with a degree of high risk. Subsequently, some groups were changed to better adapt to the medical circumstances. From 30 March, the 60-69 group was rescheduled by adding people from 56 years old, and from 20 April it was further enlarged by including people from 50 years old. The inclusion in a group means that people were eligible to get the vaccine. However, the pace of vaccination was not the same in all the autonomous communities and it also differed according to the age groups. Normally the younger, the latter provided vaccination. We exploit the different spread of vaccination coverage to estimate the impact on the MWTP.

As Table 2 shows, the percentage of people in the first two oldest groups (starting from 70) who completed the vaccination cycle were extremely high and covered almost their potential groups by 26 May, when the third wave of the survey took place. Indeed, figures ranged from 85.2% to 99.8%. However, the percentage with full vaccination was only 11.7% for the group aged 60-69 years, and even smaller for the younger groups. Six months later, when the fourth wave of the survey was conducted, most of the youngest groups had also completed the vaccination. Therefore, during the first (data collected from 20 May to 26 May 2020) and second waves of the survey (data collected from 20 November to 25 November 2020) the vaccination campaign had not begun. During the third wave (data were collected from 26 May to 7 of June 2021) almost all people over 70 years had completed their vaccination. Finally, all adult groups had been given the opportunity to receive the full vaccination when the fourth wave of the survey took place in December 2021.

Before moving to the empirical strategy, as a preliminary analysis, it is interesting to compare (Figure 1) the average MWTP of respondents over 70 years old and those up to 70 years old for the four different waves. The MWTP is higher for the respondent under 70 when the vaccination campaign had yet not begun (first two waves), but it is clearly higher for the over 70 group in the third wave compared to the rest of adult population, when most of the over 70 group completed their vaccination cycle and only a small

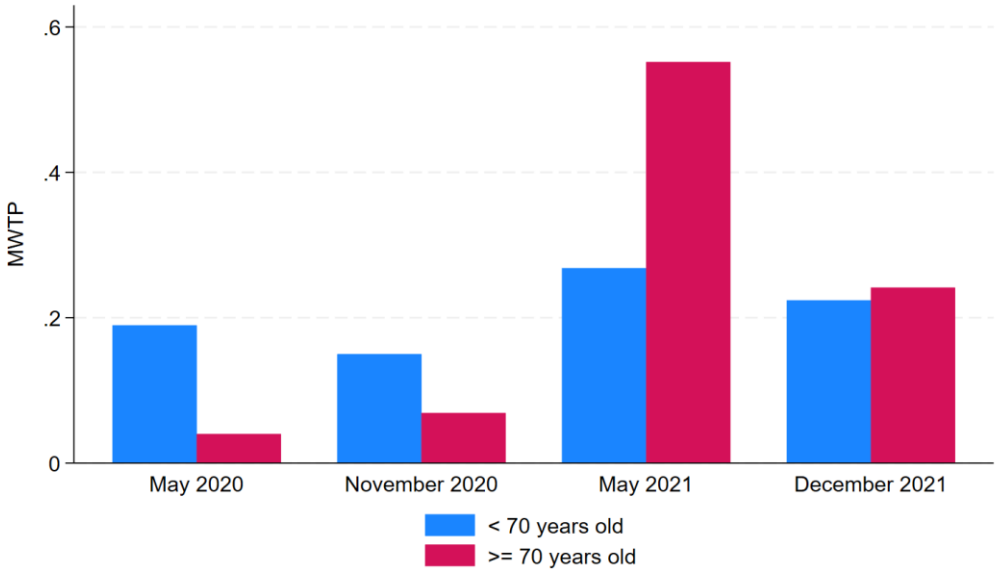
minority of people below 70 had done the same (Table 2).[13] Nonetheless, the difference vanishes six months later, when the vast majority of members in the two age groups had already completed the vaccination.

Table 2. Percentage of people with full vaccine among age. groups.

Age group	≥80 years	70-79 years	60-69 years	50-59 years	25-49 years	18-24 years
26 May data (3rd wave)	99.8%	85.2%	11.7%	8.7%	5.2%	2.7%
2 December data (4th wave)	100%	99.8%	99.3%	95.4%	85,1%[1]	84,8%[2]

Source: REGVACU, Ministry of Health, Spain
[1] 30-49 years; [2] 12-29 years

Figure 1. MWTP, by survey waves and under/over 70 years old.



Note: the MWTP values are -1 (less taxes), 0 (status quo), +1 (willing to pay up to an additional 5% of their annual income), +2 (between 6% and 10% of their annual income), and +3 (more than 10% of their annual income).
Source: *Netquest* survey.

3. Empirical strategy

We take advantage of the differences in the vaccination rates among age groups to assess

[13] A similar effect is observed in the surveys about public opinion and fiscal policy carried out annually by CIS, a public entity whose main aim is to study Spanish society. Indeed, the number of respondents over 65 years old who are more willing to pay higher taxes in order to improve public services and social benefits is greater than for the rest of adult population only in 2021, not in any other year. The 2021 survey was conducted by the end of July 2021 (CIS, 2021).

the possible impact of vaccines on MWTP. In particular, we apply a difference-in-differences analysis with a continuous treatment approach. Variation in treatment intensity makes it possible to evaluate treatments that lack untreated comparison units because all units are treated to some extent (Callaway et al., 2021). The variable that measures our treatment intensity is *vaccination coverage*, and it is the percentage of people who got full vaccine. We collect this percentage among age groups and regions during the third wave. In the first and second waves no vaccination occurred. Moreover, a generalized vaccination across ages and time in the fourth wave implies that the coverage variable does not display any significant variation across individuals. This does not let us distinguish between people more or less affected by the policy which is key for our identification strategy. Hence, we do not use the fourth wave in our estimation. Finally, since people's preferences can seriously be affected by their age, we restrict our sample to groups of people with similar ages and for which the coverage vaccination is very different. In particular we use data related to people between 60 and 79, where the group 60-69 has got a 11% vaccination coverage, and the group 70-79 has got 85.2% coverage. We then estimate the following model:

$$MWTP_{ipty} = \alpha + \beta vaccination\ coverage_{rty} + \mu X_{it} + \pi_p + \tau_t + \omega_y + \varepsilon_{ipty} \quad (1)$$

In equation (1), i is the individual indicator, p is the provincial indicator, r is the regional indicator, t is the time (wave) indicator, and y is the age class indicator.[14] $MWTP_{ipty}$ is the outcome variable that measures the marginal willingness to pay taxes ranging from -1 to +3,[15] while $vaccination\ coverage_{rty}$ is the variable that measures the intensity of the treatment: it varies by time, region and age class. Vaccination coverage ranges from 0, in the case of absence of the vaccination (e.g. first two waves for all aged groups and regions when no vaccination occurred) to 1 if all the respondents in the aged group completed all rounds of vaccination; β, the coefficient of interest, is the difference-in-differences estimate of the impact of the vaccination coverage on MWTP; and X_{it} is a vector of personal/individual variables. We control for the following variables: *political*

[14] The age class definition adopted depends on the availability of data on vaccine coverage. In our analysis, the age classes adopted are over 80, from 70 to 79, from 60 to 69, from 50 to 59, from 40 to 49, from 30 to 39, from 20 to 29, and from 12 to 19.

[15] As a robustness test, we replace the dependent variable with three values of MWTP (from -1 to +1). That is, we collapse into +1 all responses where MWTP>0, independently of the positive intensity. The results are available upon request.

ideology, *education*, *woman*, *income*, *living in a rental house*, and *having children*.[16] To account for the impact of Covid-19 on MWTP, we also control for *Covid-19 exposure within the last 30 days* and *Covid-19 exposure within 31-120 days*. The former accounts for the number of deaths per 1,000 inhabitants in the province of residence of the surveyed within the last 30 days before the interview in each wave, while the latter is the number of provincial deaths per 1,000 inhabitants over the previous 31 to 120 days before the interview in each wave. To complete the description of equation (1), π_p are the provincial fixed effects, τ_t are the time (wave) fixed effects, and ω_y are age class fixed effects. The inclusion of provincial fixed effects and time fixed effects enables us to control for province-specific time-invariant unobserved characteristics and common shocks. The error term ε_{ipt} is clustered at the provincial level.

The key identifying hypothesis for difference in differences estimates is that the variation in the MWTP of the control group is an unbiased estimate of the counterfactual. While we cannot directly test this hypothesis, we can check whether, in absence of treatment, the difference between the treated and the control group is constant over time. If the difference is constant over time, we can assume that, after the treatment, a change in this difference, if any, is determined only by the effect of the Covid-19 vaccination campaign. An event-study analysis can shed light on the plausibility of this assumption by testing whether there is no difference in pre-treatment trends of the control and treatment groups (i.e. the so-called "parallel trends" assumption). We do that by building the leads of the *vaccination coverage* variable. Namely, we anticipate the vaccination campaign such that respondents in the first and second waves should be affected by it. Hence, we estimate the following event-study specification:

$$MWTP_{ipty} = \alpha + \beta_1 vaccination\ coverage_{ryt-2} + \beta_2 vaccination\ coverage_{ryt} + \mu X_{it} + \pi_p + \tau_t + \omega_y + \varepsilon_{ipty} \quad (2)$$

We consider $vaccination\ coverage_{ryt-1}$ as the baseline and, therefore, we omit it from equation (2). This specification enables us to test the parallel trends assumption in the pre-treatment period; namely, whether the coefficient associated with the lead β_1 is not

[16] The summary statistics and the description of all variables are reported in Table A1.

statistically different from zero.

4. Results

Table 3 reports the results based on the different specifications of Equation (1). In column (1) of Table 3, we do not control for socio-economic variables. In column (2), we add socio-economic controls; in column (3), we account for the impact of Covid-19 exposure. All the three first columns in Table 3 show a positive and statistically significant coefficient at one per cent of the vaccination coverage on MWTP. The point estimates range from 1.016 to 1.046. We measure the impact of vaccination on MWTP by using the average difference of vaccination coverage between the 70-79 group and 60-69 group, 73.5 percentage points. This difference implies an increase of the MWTP between 0.747 and 0.769. This is a very high impact given that the average MWTP for the 70-79 and 60-69 groups is 0.365. We test the validity of our result by enlarging the sample through a progressive inclusion of all age groups as reported in the online appendix (Figure A1). The result holds for all age group intervals. In particular column (4) of Table 3 reports the result with the sample including all age groups (from 18 to 87 years old). This last estimate confirms a positive (0.525) and statistically 5% significant coefficient.

As robustness test, we also apply a standard difference-in-differences setting identifying the treatment group in people with a vaccine coverage higher than the median value, which coincides with people over 70 years old (*treated*). Hence, in this specification, the control group includes people under 70 years old. *Vaccination* is a dummy variable equal to 1 in the third wave. Using the standard difference in difference approach, we find that the interaction between treated, and vaccination is statistically positive and significant across all specifications, running from 0.476 to 0.766 (Table A2).

Results of the event study[17] (eq. (2)) confirm the validity of our analysis (Figure 2): the coefficient β_2 is positive and statistically significant at five per cent and the coefficient of the lead variable, β_1, is not statistically significant, bolstering the validity of the common trend assumption.

[17] The estimates of the event-study regression appear in Table A3.

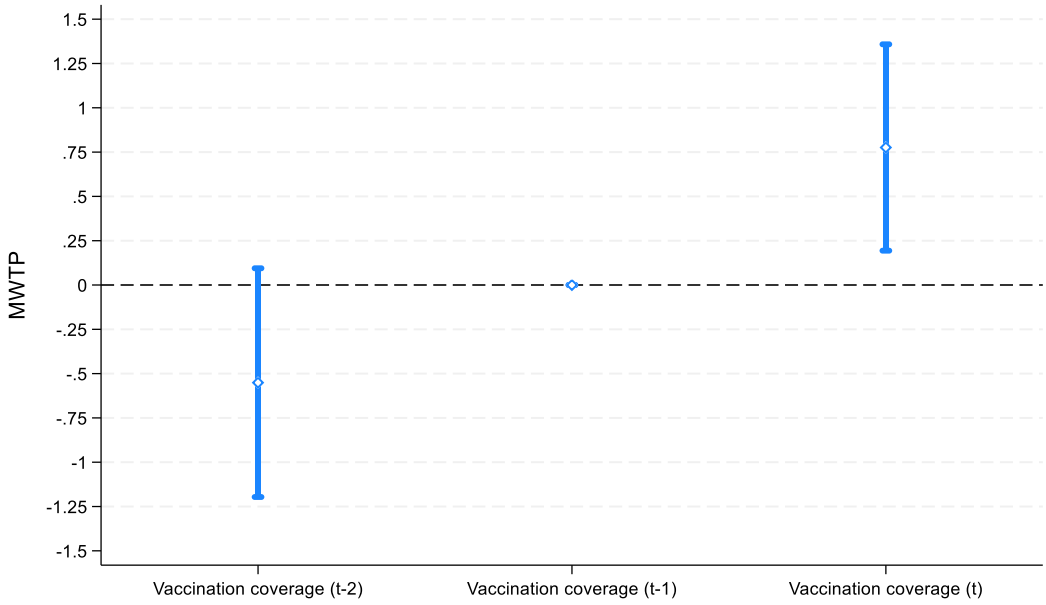
Table 3. Difference-in-differences regressions with intensity measure of the treatment (Covid-19 vaccination coverage).

	(1)	(2)	(3)	(4)
	MWTP	MWTP	MWTP	MWTP Full sample
Vaccination coverage	1.0163***	1.044***	1.046***	0.525**
	(0.331)	(0.359)	(0.360)	(0.261)
Covid-19 exposure last 30 days			0.602	-0.319
			(1.328)	(0.492)
Covid-19 exposure 31-120 days			-0.792	-0.251*
			(0.629)	(0.150)
Political ideology		-0.002	-0.002	-0.002***
		(0.002)	(0.002)	(0.001)
Education		-0.009	-0.009	0.030*
		(0.051)	(0.051)	(0.017)
Woman		-0.145	-0.157	-0.023
		(0.137)	(0.149)	(0.064)
Income		0.019	0.020	0.006
		(0.052)	(0.051)	(0.011)
Live in a rental house		0.210	0.256	-0.047
		(0.150)	(0.176)	(0.069)
With children		-0.103	-0.113	-0.226***
		(0.185)	(0.183)	(0.079)
Age		-0.012	-0.013	0.003
		(0.026)	(0.026)	(0.008)
Constant	-0.306	0.749	1.046***	0.373
	(0.114)	(1.956)	(0.360)	(1.244)
Observations	237	237	237	1,204
R-squared	0.119	0.215	0.227	0.092
Province FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Age class FE	YES	YES	YES	YES

Notes: *Vaccination coverage* is the number of people vaccinated divided by the population to be vaccinated by age class and by regions. Estimation in the first three columns uses the 60-79 years old subsample. Column 4 uses the sample containing all age groups. Robust standard errors in parentheses, clustered at provincial level.
*** p<0.01, ** p<0.05, * p<0.1

Finally, we perform a robustness test. In Table A4, we employ a fake vaccination coverage variable, falsifying the timing of the vaccination campaign as having taken place before the second wave, but after the first wave (column 1). In column 2 we build up a fake vaccination coverage variable falsifying the timing of the vaccination campaign as having taken place before the first wave. In both regressions we include all socio-economic controls and fixed effects. The estimate is not statistically significant in both cases.

Figure 2. Event-study coefficients.



Note: point estimates, together with their 90% confidence intervals, of the event study specification (equation 2). Estimation on 60-79 years old subsample. The baseline time-period of the event study is the second wave (t-1).

5. Conclusions

Paying taxes does not convey a direct benefit to taxpayers, but good governance can increase citizens' trust in the public sector and lead in turn to an increasing predisposition to contribute to the common good, that is, to higher MWTP. The Covid-19 vaccination campaign can be regarded as a visible and successful response by the public authorities and this paper analyses whether it had any impact on MWTP in Spain.

Taking advantage of the different vaccination coverage among age groups, and using survey data, a difference-in-differences empirical strategy, complemented by an event study, enables us to infer causality running from the vaccination campaign to MWTP. We do find an increase in MWTP for people belonging to age groups with a higher vaccination coverage at the time of the survey. We argue that good governance related to vaccination caused an increase in the motivation to pay more taxes.

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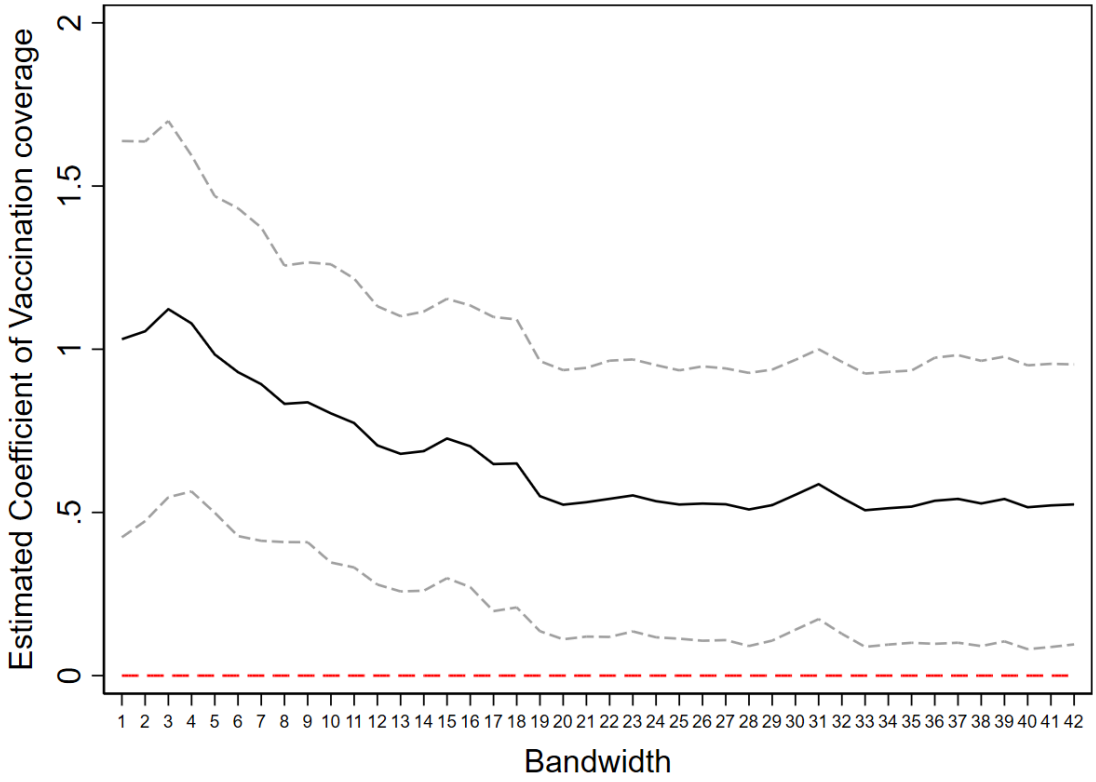
Online APPENDIX

Figure A1. Robustness test – sample selection.



Notes: The regression sample is composed of people from [60 – bandwidth value] years old to [79 + bandwidth value]. For example, with a bandwidth of 5, the sample is composed of people between 55 (60-5) years old and 84 (79+5) years old. *Vaccination coverage* is the number of people vaccinated divided by the population to be vaccinated by age class and by regions.

Table A1. Summary statistics and description of the variables.

		60-79 years old subsample					Full sample				
Variable	**Description variable**	**Obs.**	**Mean**	**Sd**	**Min**	**Max**	**Obs.**	**Mean**	**Sd**	**Min**	**Max**
Age	Age of the respondent in the day of the interview	237	67.869	5.144	60	79	1,204	45.579	15.446	18	87
Covid-19 exposure within the last 30 days	Provincial cumulated COVID-19 cases per 1,000 inhabitants, 30 days before the interview	237	0.116	0.108	0.003	0.523	1,204	0.117	0.112	0.000	0.639
Covid-19 exposure within 31-120 days	Provincial cumulated COVID-19 cases per 1,000 inhabitants, over the previous 31 to 120 days before the interview	237	0.360	0.294	0.025	2.172	1,204	0.348	0.291	0.025	2.172
Education	Categorical variable equal to 1 if the respondent has not a degree, to 2 if he/she has a first degree, 3 second degree-1st cycle, 4 second degree-2nd cycle, 5 third degree-1st cycle, 6 third degree cycle-2nd cycle, 7 master, 8 PhD	237	4.219	1.351	1	8	1,204	4.530	1.402	1	8
Having children	Dummy equal to 1 if the respondent has at least one dependent child	237	0.814	0.389	0	1	1,204	0.527	0.449	0	1
Income	Categorical variable equal to 1 if the respondent has not income, 2 if the actual expected monthly household income is less than or equal to 300€, 3 for income from 301€ to 600€, 4 for income from 601€ to 900€, 5 for income from 901€ to 1,200€, 6 for income from 1,201€ to 1,800€, 7 for income 1,801€ to 3,000€, 8 for income from 3,001€ to 6,000€, 9 for income more than 6,000€	237	6.257	1.897	2	10	1,204	5.946	2.181	1	10
Living in a rental house	Dummy equal to 1 if the respondent lives in a rental house	237	0.152	0.360	0	1	1,204	0.237	0.425	0	1
MWTP	Variable equal to -1 (less taxes), 0 (status quo), +1 (willing to pay up to an additional 5% of their annual income), +2 (between 6% and 10% of their annual income), and +3 (more than 10% of their annual income).	237	0.241	0.910	-1	3	1,204	.040	.127	-1	3
Political ideology	Political ideology of the respondent from 1 (extreme-left wing) to 10 (extreme-right wing)	237	4.616	2.443	1	10	1,204	4.515	2.536	1	10
Treated	Dummy equal to 1 if the respondent is over 70 years old	237	0.662	0.473	0	1	1,204	0.132	0.339	0	1
Woman	Dummy equal to 1 if the respondent is a female	237	0.380	0.486	0	1	1,204	0.502	0.500	0	1
Vaccination	Dummy equal to 1 in the third wave, when the vaccination campaign has started	237	0.342	0.475	0	1	1,204	0.332	0.471	0	1
Vaccination coverage	Percentage of people completed vaccinated	237	0.125	0.264	0	0.962	1,204	0.040	0.127	0	0.962

Table A2. Difference-in-difference, standard approach, regressions.

	(1)	(2)	(3)	(4)
	MWTP	MWTP	MWTP	MWTP Full sample
Treated	-0.214	-0.099	-0.072	-0.067
	(0.153)	(0.292)	(0.297)	(0.800)
Treated × Vaccination	0.751***	0.775***	0.766***	0.476**
	(0.231)	(0.247)	(0.254)	(0.191)
Covid-19 exposure last 30 days			0.541	-0.335
			(1.301)	(0.494)
Covid-19 exposure 31-120 days			-0.760	-0.247
			(0.610)	(0.150)
Political ideology		-0.001	-0.001	-0.002**
		(0.002)	(0.002)	(0.001)
Education		-0.011	-0.011	0.030*
		(0.050)	(0.051)	(0.017)
Woman		-0.147	-0.158	-0.024
		(0.138)	(0.149)	(0.064)
Income		0.019	0.020	0.006
		(0.052)	(0.051)	(0.011)
Live in a rental house		0.217	0.261	-0.046
		(0.147)	(0.173)	(0.069)
With children		-0.111	-0.121	-0.226***
		(0.182)	(0.181)	(0.079)
Age		-0.014	-0.014	0.003
		(0.026)	(0.026)	(0.008)
Constant	-0.165	0.874	1.424	0.435
	(0.121)	(1.711)	(1.920)	(0.600)
Observations	237	237	237	1,204
R-squared	0.202	0.218	0.229	0.093
Province FE	YES	YES	YES	YES
Wave FE	YES	YES	YES	YES
Age class FE	YES	YES	YES	YES

Notes: *Treated* is a dummy variable equal to 1 if respondents have more than 70 years old, 0 otherwise. *Vaccination* is a dummy variable equal to 1 only in the third wave. Estimation in the first three columns uses the 60-79 years old subsample. Column 4 uses the sample containing all age groups. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A3. Event study regressions (baseline: vaccination coverage $_{t-1}$).

	(1) MWTP
Vaccination coverage$_{t-2}$	-0.551
	(0.382)
Vaccination coverage$_{t}$	0.776**
	(0.345)
Covid-19 exposure last 30 days	0.306
	(1.351)
Covid-19 exposure 31-120 days	-0.743
	(0.642)
Political ideology	-0.002
	(0.002)
Education	-0.008
	(0.050)
Woman	-0.147
	(0.150)
Income	0.018
	(0.051)
Live in a rental house	0.231
	(0.184)
With children	-0.102
	(0.169)
Age	-0.013
	(0.027)
Constant	1.011
	(2.268)
Observations	237
R-squared	0.220
Province FE	YES
Wave FE	YES
Age class FE	YES

Notes: *Vaccination coverage* is the number of people vaccinated divided by the population to be vaccinated by age class and by regions. Estimation on 60-79 years old subsample. Robust standard errors in parentheses, clustered at provincial level.
*** p<0.01, ** p<0.05, * p<0.1

Table A4. Fake robustness test.

	(1) MWTP	(2) MWTP
Fake vaccination coverage$_{t-1}$	0.544	
	(0.388)	
Fake vaccination coverage$_{t-2}$		-0.571
		(0.390)
Covid-19 exposure last 30 days	-0.162	-0.218
	(2.650)	(2.682)
Covid-19 exposure 31-120 days	-0.355	-0.341
	(0.768)	(0.778)
Political ideology	-0.001	-0.001
	(0.002)	(0.002)
Education	-0.000	-0.001
	(0.068)	(0.068)
Woman	0.086	0.087
	(0.174)	(0.174)
Income	0.018	0.019
	(0.061)	(0.062)
Live in a rental house	-0.129	-0.130
	(0.227)	(0.225)
With children	0.005	0.007
	(0.211)	(0.212)
Age	0.037	0.036
	(0.039)	(0.039)
Constant	-3.093	-2.230
	(2.774)	(2.656)
Observations	155	155
R-squared	0.216	0.217
Province FE	YES	YES
Wave FE	YES	YES
Age class FE	YES	YES

Notes: Estimation on 60-79 years old subsample. Robust standard errors in parentheses, clustered at provincial level.
*** p<0.01, ** p<0.05, * p<0.1

2019

2019/1, Mediavilla, M.; Mancebón, M. J.; Gómez-Sancho, J. M.; Pires Jiménez, L.: "Bilingual education and school choice: a case study of public secondary schools in the Spanish region of Madrid"
2019/2, Brutti, Z.; Montolio, D.: "Preventing criminal minds: early education access and adult offending behavior"
2019/3, Montalvo, J. G.; Piolatto, A.; Raya, J.: "Transaction-tax evasion in the housing market"
2019/4, Durán-Cabré, J.M.; Esteller-Moré, A.; Mas-Montserrat, M.: "Behavioural responses to the re)introduction of wealth taxes. Evidence from Spain"
2019/5, Garcia-López, M.A.; Jofre-Monseny, J.; Martínez Mazza, R.; Segú, M.: "Do short-term rental platforms affect housing markets? Evidence from Airbnb in Barcelona"
2019/6, Domínguez, M.; Montolio, D.: "Bolstering community ties as a means of reducing crime"
2019/7, García-Quevedo, J.; Massa-Camps, X.: "Why firms invest (or not) in energy efficiency? A review of the econometric evidence"
2019/8, Gómez-Fernández, N.; Mediavilla, M.: "What are the factors that influence the use of ICT in the classroom by teachers? Evidence from a census survey in Madrid"
2019/9, Arribas-Bel, D.; Garcia-López, M.A.; Viladecans-Marsal, E.: "The long-run redistributive power of the net wealth tax"
2019/10, Arribas-Bel, D.; Garcia-López, M.A.; Viladecans-Marsal, E.: "Building(s and) cities: delineating urban areas with a machine learning algorithm"
2019/11, Bordignon, M.; Gamalerio, M.; Slerca, E.; Turati, G.: "Stop invasion! The electoral tipping point in anti-immigrant voting"

2020

2020/01, Daniele, G.; Piolatto, A.; Sas, W.: "Does the winner take it all? Redistributive policies and political extremism"
2020/02, Sanz, C.; Solé-Ollé, A.; Sorribas-Navarro, P.: "Betrayed by the elites: how corruption amplifies the political effects of recessions"
2020/03, Farré, L.; Jofre-Monseny; J., Torrecillas, J.: "Commuting time and the gender gap in labor market participation"
2020/04, Romarri, A.: "Does the internet change attitudes towards immigrants? Evidence from Spain"
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2020/06, McDougal, T.L.; Montolio, D.; Brauer, J.: "Modeling the U.S. firearms market: the effects of civilian stocks, crime, legislation, and armed conflict"
2020/07, Veneri, P.; Comandon, A.; Garcia-López, M.A.; Daams, M.N.: "What do divided cities have in common? An international comparison of income segregation"
2020/08, Piolatto, A.: "'Information doesn't want to be free': informational shocks with anonymous online platforms"
2020/09, Marie, O.; Vall Castello, J.: "If sick-leave becomes more costly, will I go back to work? Could it be too soon?"
2020/10, Montolio, D.; Oliveira, C.: "Law incentives for juvenile recruiting by drug trafficking gangs: empirical evidence from Rio de Janeiro"
2020/11, Garcia-López, M.A.; Pasidis, I.; Viladecans-Marsal, E.: "Congestion in highways when tolls and railroads matter: evidence from European cities"
2020/12, Ferraresi, M.; Mazzanti, M.; Mazzarano, M.; Rizzo, L.; Secomandi, R.: "Political cycles and yardstick competition in the recycling of waste. evidence from Italian provinces"
2020/13, Beigelman, M.; Vall Castelló, J.: "COVID-19 and help-seeking behavior for intimate partner violence victims"
2020/14, Martínez-Mazza, R.: "Mom, Dad: I'm staying" initial labor market conditions, housing markets, and welfare"
2020/15, Agrawal, D.; Foremny, D.; Martínez-Toledano, C.: "*Paraísos fiscales*, wealth taxation, and mobility"
2020/16, Garcia-Pérez, J.I.; Serrano-Alarcón, M.; Vall Castelló, J.: "Long-term unemployment subsidies and middle-age disadvantaged workers' health"

2021

2021/01, Rusteholz, G.; Mediavilla, M.; Pires, L.: "Impact of bullying on academic performance. A case study for the community of Madrid"
2021/02, Amuedo-Dorantes, C.; Rivera-Garrido, N.; Vall Castelló, J.: "Reforming the provision of cross-border medical care evidence from Spain"

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2021/04, Arenas, A.; Calsamiglia, C.; Loviglio, A.: "What is at stake without high-stakes exams? Students' evaluation and admission to college at the time of COVID-19"
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2021/06, Asensio, J.; Matas, A.: "The impact of 'competition for the market'regulatory designs on intercity bus prices"
2021/07, Boffa, F.; Cavalcanti, F.; Piolatto, A.: "Ignorance is bliss: voter education and alignment in distributive politics"

2022

2022/01, Montolio, D.; Piolatto, A.; Salvadori, L.: "Financing public education when altruistic agents have retirement concerns"
2022/02, Jofre-Monseny, J.; Martínez-Mazza, R.; Segú, M.: "Effectiveness and supply effects of high-coverage rent control policies"
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2022/07, Foremny, D.; Sorribas-Navarro, P.; Vall Castelló, J.: "Income insecurity and mental health in pandemic times"
2022/08, Garcia-López, M.A.; Viladecans-Marsal, E.: "The role of historic amenities in shaping cities"
2022/09, Cheshire, P. C., Hilber, C. A. L., Montebruno, P., Sanchis-Guarner, R.: "(IN)convenient stores? What do policies pushing stores to town centres actually do?"
2022/10, Sanchis-Guarner, R.: "Decomposing the impact of immigration on house prices"

2023

2023/01, Garrouste, M., Lafourcade, M.: "Place-based policies: Opportunity for deprived schools or zone-and-shame effect?"
2023/02, Durán-Cabré, J.M., Esteller-Moré A., Rizzo L., Secomandi, R.: "Fiscal Knowledge and its Impact on Revealed MWTP in COVID times: Evidence from Survey Data"
2023/03, Esteller-Moré A., Galmarini U.: "Optimal tax administration responses to fake mobility and underreporting"
2023/04, Armijos Bravo, G., Vall Castelló, J.: "Job competition in civil servant public examinations and sick leave behavior"
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Tax Systems Analysis

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