

The effect of compulsory schooling on vaccination against COVID and influenza



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Education



Vaccination



Introduction

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Large literature on correlation between education and COVID vaccination. See, e.g. [Cascini et al., 2021] for a general overview and [Bergen et al., 2023], [Borga et al., 2022], [Graeber et al., 2020], [Mondal et al., 2021], [Bergmann et al., 2021], [Walkowiak and Walkowiak, 2021], [Huebener and Wagner, 2021], [Humer et al., 2021], for a non-exhaustive list of studies.

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Research question

What is the effect of education on vaccination against COVID and influenza?

First: study Germany.

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- ▶ Income ([Pischke and von Wachter, 2008])
- ▶ Cognition ([Kamhöfer and Schmitz, 2016])
- ▶ Health ([Kemptner et al., 2011], [Begerow and Jürges, 2022])
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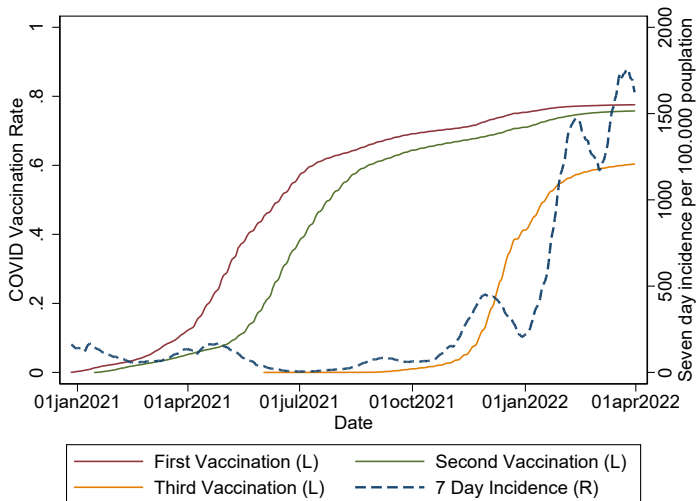
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Also look at effects of education on influenza vaccination. See [Fletcher and Frisvold, 2009].

Vaccination status and seven day incidence in Germany



Notes: L = Left-hand side axis, R = Right-hand side axis. This figure does not use the estimation sample used in the paper but shows official nationwide numbers. Sources: [Bundesministerium für Gesundheit, 2022] and [Robert Koch-Institut, 2022].

Append two surveys

- ▶ Casa monitor, wave 2 and 3
- ▶ SHARE, wave 9 (Wave 2 Corona questionnaire)

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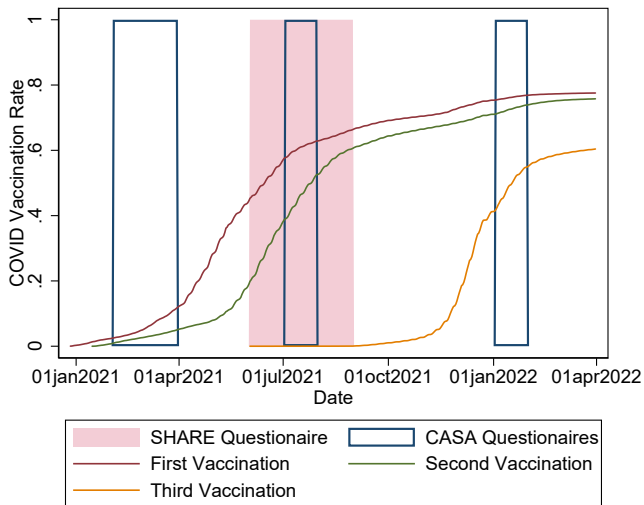
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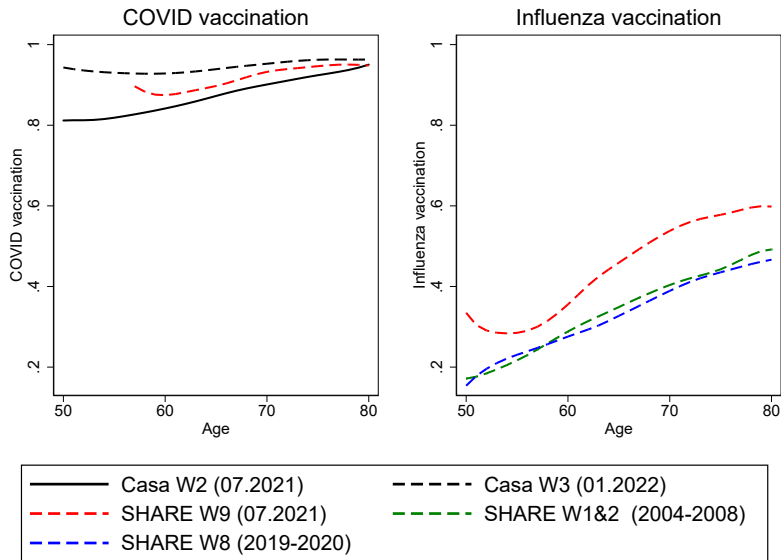
Age range 59 - 91 (mean 69)

Timing of the surveys



Notes: Source: [Bundesministerium für Gesundheit, 2022].

Distribution of vaccination by age and data source



Descriptives

	COVID sample				Influenza sample			
	Mean	St. dev	Min	Max	Mean	St. dev	Min	Max
Covid vaccination	0.92	0.27	0	1				
Influenza vaccination					0.37	0.48	0	1
Years of schooling	10.45	1.79	8	13	9.74	1.77	8	13
Birth year	1952	4.53	1930	1961	1950	5.74	1926	1961
Age	69.21	4.52	59	91	65.18	7.89	43	93
Male	0.54	0.50	0	1	0.47	0.50	0	1
Data source: CASA Wave 2	0.40	0.49	0	1				
Data source: CASA Wave 3	0.39	0.49	0	1				
Data source: SHARE Wave 1					0.22	0.42	0	1
Data source: SHARE Wave 2					0.06	0.24	0	1
Data source: SHARE Wave 8					0.40	0.49	0	1
Data source: SHARE Wave 9	0.21	0.41	0	1	0.31	0.46	0	1
Observations		4,024				2,675		

Notes: CASA and SHARE data after sample selection.

Empirical specification

$$Y_{ics} = \beta_0 + \beta_1 S_{ics} + \beta_2 \mathit{male}_i + \gamma_c + \delta_s + \alpha(\eta_s \times \mathbf{c}) + \theta_{\mathit{survey}} + \varepsilon_{ics}$$

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Reforms

Federal State	Pivotal birth cohort	Reform year
Schleswig Holstein	1932	1947
Hamburg	1931	1946
Lower Saxony	1947	1962
Bremen	1944	1959
North Rhine-Westphalia	1951	1966
Hesse	1951	1966
Rhineland Palatinate	1952	1967
Baden-Wuerttemberg	1952	1967
Bavaria	1954	1969
Saarland	1943	1958

Source: [Begerow and Jürges, 2022]. Pivotal cohort is the first birth cohort the reform applies to.

Regressions results

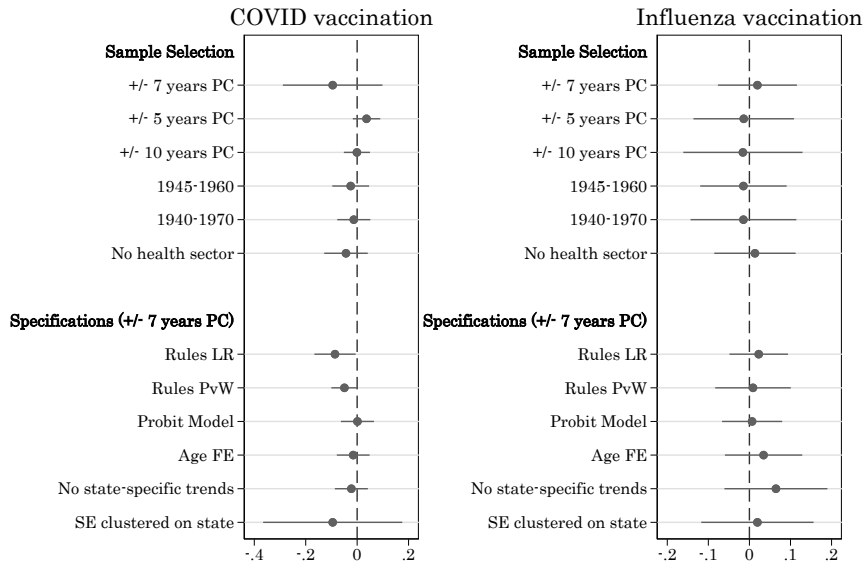
	OLS		2SLS	
	COVID vaccination (1)	Influenza vaccination (2)	COVID vaccination (3)	Influenza vaccination (4)
<i>First stage coefficient of the instrument:</i>				
Post reform			0.368*** (0.086)	0.491*** (0.151)
<i>Second stage:</i>				
Years of schooling	0.001 (0.003)	0.009 (0.007)	-0.033 (0.051)	0.019 (0.058)
Male	0.023** (0.009)	-0.050** (0.021)	0.036* (0.019)	-0.054* (0.030)
CASA W2	-0.020* (0.012)		0.008 (0.043)	
CASA W3	0.034*** (0.011)		0.062 (0.043)	
SHARE W1		-0.367*** (0.026)		-0.371*** (0.035)
SHARE W2		-0.300*** (0.035)		-0.302*** (0.038)
SHARE W8		-0.154*** (0.019)		-0.154*** (0.019)
Observations	4,021	2,668	4,021	2,668

Vaccination rates by university degree

	Restricted sample		Full sample	
	COVID vaccination (1)	Influenza vaccination (2)	COVID vaccination (3)	Influenza vaccination (4)
Without University Degree	0.9242	0.3923	0.8573	0.4099
With University Degree	0.9239	0.4629	0.8756	0.4570

Note: Restricted sample = sample restricted to individuals born seven years around the pivotal cohort, analogous to the baseline sample. Full sample = Full sample for West Germany without further restrictions.

Robustness checks and effect heterogeneity

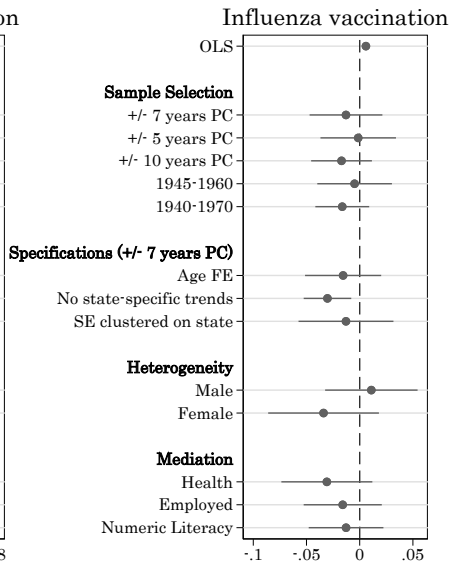
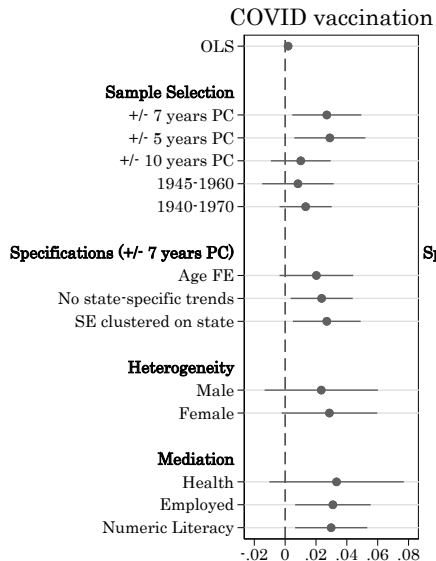


Europe-wide analysis

	Change in years	Pivotal cohort	Number of observations	
			Sample COVID	Sample influenza
Austria	8-9	1951	1,273	2,636
Belgium: Flanders	8-9	1939	580	1,776
Czech Republic	8-9	1947	1,371	4,012
Denmark	4-7	1947	815	2,645
France	8-10	1953	1,109	3,319
Greece	6-9	1963	971	1,965
Italy	5-8	1949	1,804	3,944
Netherlands	7-9	1936	137	1,620
Spain	6-8	1957	702	1,900
Germany			841	2,682
BW	8-9	1952		
BY	8-9	1954		
HB	8-9	1944		
HH	8-9	1931		
HE	8-9	1951		
NI	8-9	1947		
NRW	8-9	1951		
RLP	8-9	1952		
SL	8-9	1943		
SH	8-9	1933		
Total			9,603	26,499

Notes: The table shows compulsory schooling reforms for each country together with the change in years of compulsory schooling and the first cohort affected by the reform. Information on schooling reforms taken from [Begerow and Jürqes, 2022] for Germany and Hendrik Schmitz (UPB)

Regression results Europe



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- ▶ Local average treatment effect: compliers are individuals at the lowest education margin.












Thank you for your attention!

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