

Online Appendix

The effect of increasing education efficiency on university enrollment:
Evidence from administrative data and an unusual schooling reform in
Germany

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Table A.1: Placebo tests and dynamics of the treatment effect

	Enrollment			Speed			Study progress		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
4 years prior	0.004 (0.010)		0.009 (0.009)	0.003 (0.009)	0.070*** (0.007)	0.001 (0.008)	-0.008 (0.005)	-0.007 (0.006)	
3 years prior	-0.003 (0.007)		-0.004 (0.003)	0.006 (0.008)	-0.013 (0.009)	0.005 (0.005)	-0.006 (0.004)	-0.002 (0.004)	
2 years prior	-0.008 (0.007)		-0.008 (0.006)	0.007 (0.008)	-0.013 (0.009)	0.005 (0.007)	-0.003 (0.005)	-0.000 (0.005)	
Last G9		-0.015* (0.007)	-0.011** (0.005)		0.070*** (0.007)	0.066*** (0.006)		-0.007* (0.003)	
Double cohort		-0.085*** (0.011)	-0.081*** (0.009)		-0.013 (0.009)	-0.017* (0.010)		-0.013* (0.007)	
1 year after		-0.057*** (0.016)	-0.053*** (0.013)		-0.071*** (0.013)	-0.075*** (0.013)		-0.024** (0.010)	
2 years after		-0.071*** (0.018)	-0.066*** (0.016)		-0.067*** (0.014)	-0.070*** (0.014)		-0.029*** (0.008)	
3 years after		-0.037 (0.022)	-0.033 (0.021)		-0.056** (0.025)	-0.058** (0.024)		-0.037*** (0.006)	
4 or more years after		-0.051** (0.022)	-0.047** (0.020)		-0.022 (0.019)	-0.023 (0.018)		-0.039*** (0.009)	
$N_{state*cohort}$	180	180	180	180	180	180	165	165	165
$N_{individuals}$	2,601,880	2,601,880	2,601,880	1,987,444	1,987,444	1,987,444	1,656,629	1,656,629	1,656,629

Notes: This table reports the G8 reform effects on different outcomes as indicated by the column header. All estimates are based on our main specification as outlined in Eq. (??), where in column (1), (4), and (6) we additionally include one further regressor per row that picks up the effect of the respective placebo policy. In the remaining columns of this table we substitute the single G8 indicator in Eq. (??) by a set of binary variables capturing the reform's effect for cohorts before and after the reform implementation. Standard errors are clustered at the state level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2: Estimating the G8 effect within the double cohort

	Enrollment		Speed		Study progress	
	(1)	(2)	(3)	(4)	(5)	(6)
G8 reform	-0.060*** (0.017)	-0.060*** (0.017)	-0.068*** (0.014)	-0.068*** (0.014)	-0.026*** (0.009)	-0.026*** (0.009)
Last G9	-0.016** (0.007)	-0.016** (0.007)	0.069*** (0.007)	0.069*** (0.007)	-0.007* (0.003)	-0.007* (0.003)
DC	-0.085*** (0.011)		-0.015 (0.009)		-0.013* (0.007)	
G8 in DC		-0.103*** (0.017)		-0.051*** (0.008)		-0.001 (0.006)
G9 in DC		-0.071*** (0.010)		0.015 (0.011)		-0.022** (0.008)
$N_{state*cohort}$	180	191	180	191	165	175
$N_{individuals}$	2,601,880	2,601,880	1,987,444	1,987,444	1,656,629	1,656,629

Notes: In this estimation we aim to disentangle the overall double cohort (DC) effect into an effect for the cohort's G8 and G9 students. As the exact treatment status is unknown for students in the double cohort, we assign it based on birth information and school entry regulations. Children who turn six before (after) June 30th of a given year usually start school in that (the following) year. Thus, double cohort graduates, who are older than 19, or 19 and born before June 30th, are assumed to be G9 students; likewise, graduates, who are younger than 19, or 19 and born after June 30th, are assumed to be G8 students. Note that the computation of separate enrollment rates within the double cohort requires separate graduation numbers for a cohorts' G8 and G9 students. Two states lack this information. For these two states, we assume that the ratio of G8 and G9 students within the double cohort is the same as in the other eleven treatment states, which provide the relevant information. All estimates are based on our preferred specification and include state and time fixed effects. Standard errors are clustered at the state level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: Implementation of G8 and other education reforms in the federal states

	School policies			University policies	
	G8	Central exit examination	Tracking in grade 7	Restricted upper-secondary subject choice	Tuition fees
Change from G9 to G8					
Saxony-Anhalt	from 2007	all	2006-2009	from 2005	none
Mecklenburg-Vorpommern	from 2008	all	none	from 2008	none
Saarland	from 2009	all	none	from 2010	2007-2009
Hamburg	from 2010	all	none	from 2011	2007-2011
Bavaria	from 2011	all	none	from 2011	2007-2012
Lower-Saxony	from 2011	from 2006	until 2011	from 2008	2006-2013
Baden-Württemberg	from 2012	all	none	from 2004	2007-2011
Bremen	from 2012	from 2007	until 2011	all	none
Berlin	from 2012	from 2007	all	all	none
Brandenburg	from 2012	from 2005	all	none	none
North Rhine-Westphalia	from 2013	from 2007	none	all	2007-2010
Always G8					
Saxony	all	all	none	from 2010	none
Thuringia	all	all	none	from 2011	none
Always G9 (in observation period)					
Rhineland-Palatinate	none	all	none	from 2011	none
Schleswig-Holstein	from 2016	from 2008	none	from 2011	none
Excluded from estimation sample					
Hesse	from 2012	from 2007	none	from 2005	2007

Notes: This table informs about changes in education policies during our sample period. For school policies, numbers refer to the affected graduation cohort while for university policies numbers refer to years. *G8* indicates the year of the double graduation cohort. *Centralized school exit examinations* shift the design of exit exams from high schools to federal state institutions such that all students in the specific state sit the same exit exam. *Tracking in grade 7* indicates whether tracking takes place in grade 7 (or earlier). *Restricted upper secondary subject choice* indicates graduation cohorts for whom the set of subject choices for the final two years at academic high schools has been restricted. *Tuition fees* indicates the years in which tuition fees (about 500 Euro per semester) were charged. Sources for the reform dates are available from the authors upon request.

Table A.4: Effect of the G8 reform on the number of graduates

	no. of graduates normalized with no. of			log of
	18-20 year olds (1)	18-19 year olds (2)	19 year olds (3)	no. of graduates (4)
G8 reform	-0.008 (0.014)	-0.000 (0.013)	-0.006 (0.014)	-0.072 (0.231)
$N_{state*cohort}$	195	195	195	195

Notes: The table reports the effect of the G8 reform on graduation rates with different normalizations. Columns (1)-(3) normalize the number of graduates from academic high schools by the average size of the populations of 18-20, 18-19 and 19 year olds, respectively. Column (4) takes the log of the number of graduates instead. All estimates are based on our main specification as outlined in Eq. (??) and rely on the 2002-2014 graduation cohorts. Standard errors are clustered at the state level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Coding of the SOEP outcome variables

Outcome variable	SOEP question	Original scale	Outcome coding
Perceived prob. of being admitted to preferred study program	What are the chances that you are admitted to your preferred study program/apprenticeship?	0-100 %	0-100
High involvement of parents in educational/occupational choice	I strongly incorporate my parents' suggestions when choosing my occupation.	1 (strongly agree) - 4 (not at all)	= 1 if agree or strongly agree
Sure about future occupation	Do you already know which occupation you will choose?	Yes, to some degree; yes, with certainty; no, still not clear	= 1 if "yes, with certainty"
School grades	What was your last grade in [German, Math, Foreign Languages]?	1 (best) - 6 (worst)	1 (worst) - 6 (best)
Paid private tutor	Did you ever get paid private tutor lessons?	yes/no	=1 if yes

Note: The table provides an overview of the relevant outcomes from the SOEP data as well as their scaling and coding.