

The Impact of Tuition Fees on Educational Inequality

Evidence from Germany

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Motivation

- Educational choices depend on the family background of a person, e.g.
 - ▶ Income of the family
 - ▶ Education of the parents
- Educational policies should be aimed to reduce the family dependence
- Tuition fees might increase educational inequality

Research Questions

- Do tuition fees affect students' (aged 17-18) intention to acquire a university degree?
- Do tuition fees especially deter high school students from low income families from aiming to acquire a university degree?

Institutional Background

- The conservative governments of the following federal states filed a suit against a law which prohibited the implementation of tuition fees:
 - ▶ Baden-Wuerttemberg
 - ▶ Bavaria
 - ▶ Hamburg
 - ▶ Saarland
 - ▶ Saxony
 - ▶ Saxony-Anhalt
- In January 2005, the Federal Constitutional Court (Bundesverfassungsgericht) decided against the ban of tuition fees

Institutional Background

State	Legislation passed	Fee introduced	Legislation for termination passed	Fee terminated
Baden-Württemberg	12/2005	4/2007	4/2011	4/2012
Bavaria	5/2006	4/2007	5/2013	10/2013
Hamburg	7/2006	4/2007	4/2011	10/2012
Hesse	10/2006	10/2007	6/2008	10/2008
Lower Saxony	12/2005	10/2006	7/2013	10/2014
North Rhine-Westphalia	3/2006	10/2006	4/2011	10/2011
Saarland	7/2006	10/2007	2/2010	4/2010

Federal States without tuition fees: Berlin, Brandenburg, Bremen, Mecklenburg-West Pomerania, Rhineland-Palatinate, Saxony, Saxony Anhalt, Schleswig Holstein and Thuringia

- Tuition fee: 1,000€ per academic year

Related Literature - Mean Effects

- Hübner (2012)
 - ▶ Data: Federal Statistical Office (2002-2007)
 - ▶ Estimated effect of tuition fees: 2.7 percentage points (6.4%) decrease in enrollment
- Tecu (2009)
 - ▶ Data: Federal Statistical Office (2004-2007)
 - ▶ Estimated effect: 6% decrease in enrollment
- Bruckmeier and Wigger (2013)
 - ▶ Data: Federal Statistical Office (2002-2008)
 - ▶ Estimated effect: no significant average effect, effect varies between federal states.

Related Literature - Mean Effects

- Limitations:

- ▶ These studies cannot distinguish between students who seek to obtain a degree and students "who's main intention might not be to graduate"
- ▶ Study short-term effects

Identification

- Quasi-natural experiment
- States without tuition fees serve as a control group
 - ▶ Lower bound of the true effect
 - ★ Individuals of "tuition states" can migrate to "non-tuition states"
 - ★ Geographic mobile high school graduates of non-tuition states might also be affected
- Variation of the introduction and abolishment of tuition fees over time and states
- Identification of the Average Treatment Effect on the Treated (ATT)

Data

- German Socio-Economic Panel: especially Youth Questionnaire
 - ▶ Pooled cross sections (2000-2011)
 - ▶ At the age of 17, participants receive a special questionnaire
 - ▶ Detailed information about current and past achievements at school and future educational plans

- Question: Which of the following do you intend on acquiring?
(You can check more than one!)
 - ▶ Completed apprenticeship
 - ▶ Full-time vocational school or health school
 - ▶ Higher level trade and technical school (*Meister-, Technikerschule*)
 - ▶ Public employee training certificate
 - ▶ A degree from an accredited career training academy
 - ▶ **A degree from a polytechnical college (Fachhochschule)**
 - ▶ **A university degree**

Data - Sample

- Individuals (n=2137) who:
 - ▶ attend a upper secondary school (*Gymnasium*)
 - ▶ intend to acquire a upper secondary school leaving certificate (*Abitur*)
 - ▶ have already a upper secondary school leaving certificate (*Abitur*)

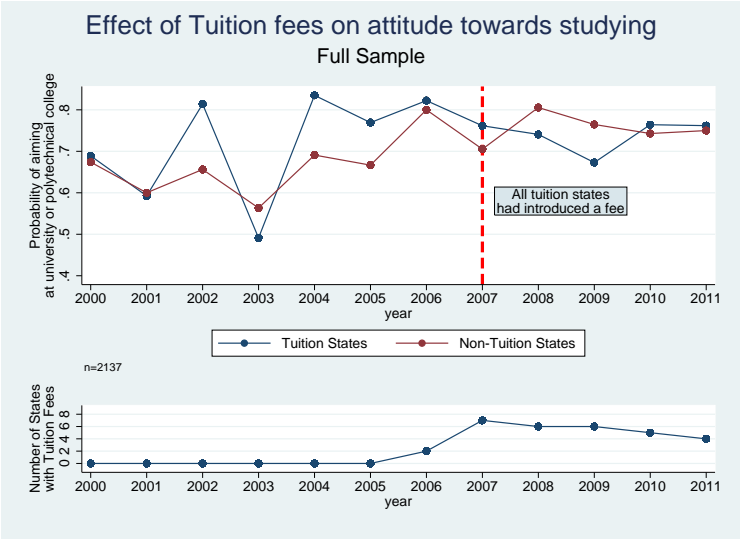
Descriptive Statistics

	Before October 2006	
	Tuition States	Non-Tuition States
Aiming at higher degree	0.665 (0.472)	0.634 (0.482)
Female	0.547 (0.498)	0.564 (0.497)
Parents with university degree	0.385 (0.487)	0.312 (0.464)
Migration background	0.227 (0.419)	0.062 (0.242)
Equiv. household income in Euro	1826.6 (1952.3)	1474.5 (755.9)
N	711	385

Means are displayed and standard deviations are in parenthesis.

Equivalent household income is measured in 2010 prices.

Graph



Estimation

- Linear Probability Model
 - ▶ Dependent variable: Equal to one if individuals answer that they intend to acquire a university or a polytechnical college degree, and zero otherwise.
- Difference-in-differences (DiD) estimation
- Clustered standard errors at the federal state level

Estimation

$$y_{ist} = \beta_0 + \beta_1 \textit{Tuition}_{st} + \lambda_s + \gamma_t + X_{ist}\beta + u_{ist}$$

- *Tuition* is a dummy and is one if a tuition fee is implemented in the individual's federal state of residence at the time of the interview.
- *X*:
 - ▶ *Female*
 - ▶ *Migration background*
 - ▶ *Parents university*
 - ▶ *Household equivalent income*
 - ▶ *Unemployment/Vacancies*

Results

Dependent variable: Intention to acquire a university or polytechnical college degree

	(1)	(2)	(3)	(4)
	Full Sample	Full Sample	Full Sample	Full Sample
Tuition	-0.073** (0.028)	-0.080*** (0.026)	-0.072** (0.026)	-0.075** (0.026)
Unemployment/Vancancies		0.00169 (0.00181)	0.00217 (0.00165)	0.00226 (0.00163)
Migration			-0.0129 (0.0319)	-0.00771 (0.0314)
Parents university			0.186*** (0.0191)	0.179*** (0.0222)
Female				0.00172 (0.0124)
Household equivalent income				0.0127 (0.0133)
Time Fixed Effects	YES	YES	YES	YES
State Fixed Effects	YES	YES	YES	YES
N	1986	1986	1986	1986

Clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Results: Varying Effects

Dependent variable: Intention to acquire a university or polytechnical college degree

	Full Sample	Reference				
		Poorest 10%	Poorest 20%	Poorest 30%	Male	Parents w/o uni degree
Tuition	-0.075** (0.026)	-0.303*** (0.056)	-0.168*** (0.048)	-0.151*** (0.048)	-0.089*** (0.027)	-0.087** (0.030)
Higher income		0.088** (0.032)	0.075** (0.031)	0.066** (0.028)		
Tuition* Higher income		0.251*** (0.043)	0.123** (0.044)	0.113* (0.054)		
Tuition* Female					0.026 (0.043)	
Tuition Parents Uni*						0.033 (0.030)
Time Fixed Effects	YES	YES	YES	YES	YES	YES
State Fixed Effects	YES	YES	YES	YES	YES	YES
N	1986	1986	1986	1986	1986	1986

Further Covariates: Female, migration, parents university, household equivalent income and unemployment/vacancies

Clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Results: Varying Effects

	Poorest 10%	Poorest 20%	Poorest 30%
Panel A: Baseline			
Tuition	-0.279*** (0.056)	-0.149** (0.048)	-0.138** (0.048)
Tuition* Higher income	0.235*** (0.047)	0.111** (0.046)	0.107* (0.053)
Panel B: Ability (School Grades)			
Tuition	-0.241*** (0.055)	-0.109* (0.052)	-0.096* (0.047)
Tuition* Higher income	0.240*** (0.052)	0.115** (0.049)	0.112* (0.054)
Panel C: Ability (School Grades) & Education Parents			
Tuition	-0.241*** (0.0552)	-0.113** (0.0518)	-0.0989** (0.0471)
Tuition* Higher income	0.237*** (0.0469)	0.110* (0.0524)	0.108* (0.0610)
Time Fixed Effects	YES	YES	YES
State Fixed Effects	YES	YES	YES
N	1986	1986	1986

Further Covariates: Female, migration, parents education, school grades, household equivalent income and unemployment/vacancies

Clustered standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Robustness - Further tests

- Placebo reform
- Robust to controlling for:
 - ▶ anticipation effects
 - ▶ educational expenditure and party at power
- Probit Model

Conclusion & Outlook

- The intention of high school students to acquire a university degree is negatively influenced by tuition fees.
- Effect is mainly driven by individuals from low income families.

- Migration between states is possible
 - ▶ Lower bound of the true effect
 - ▶ Solution I: Exclude individuals who live at the border of two federal states with differences in tuition status
 - ▶ Solution II: Include an interaction term between the tuition dummy and the distance to the next university without tuition fees
- Use administrative data in order to test whether the actual number of degrees is affected by tuition fees

Appendix - Simple DiD

$$y_{ist} = \beta_0 + \delta_1 \text{TuitionState}_s + \delta_2 \text{After}_t + \delta_3 \text{TuitionState}_s \cdot \text{After}_t + u_{ist}$$

Share of high-school students who intend to acquire a higher degree

	2000-2005	2008-2010	Difference
Tuition States	0.674	0.719	0.045
Non-Tuition States	0.634	0.771	0.138
Simple DiD			-0.093

Appendix - Robustness: Placebo Reform

- Before any tuition was introduced (01/2000 - 09/2006)
 - ▶ Model 1: Tuition introduction & termination 3 years earlier
 - ▶ Model 2: Tuition introduction & termination 2 years earlier

Appendix - Robustness: Placebo Reform

Dependent variable: Intention to acquire a higher degree

	(1)	(2)
	3 years	2 years
Tuition	0.069 (0.065)	0.025 (0.055)
Time Fixed Effects	YES	YES
State Fixed Effects	YES	YES
N	1018	1018

Further Covariates: female, migration, parents university,
household equivalent income and unemployment/vacancies

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix - Robustness: Further controls

Dependent variable: Intention to acquire a university degree

	(1)	(2)	(3)	(4)
	Full Sample	Full Sample	Full Sample	Full Sample
Tuition	-0.0753** (0.0259)	-0.0855** (0.0336)	-0.0752** (0.0261)	-0.0770** (0.0278)
Announced tuition		-0.0348 (0.0524)		
Expectations parents			-0.0319 (0.0207)	
Math grade				-0.0247** (0.0109)
German grade				-0.0601** (0.0256)
Time Fixed Effects	YES	YES	YES	YES
State Fixed Effects	YES	YES	YES	YES
N	1986	1986	1975	1963

Further Covariates: female, migration, parents university, household equivalent income and unemployment/vacancies

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix - Robustness: Further controls

Dependent variable: Intention to acquire an university degree

	(1)	(2)	(3)	(4)
	Full Sample	Full Sample	Full Sample	Full Sample
Tuition	-0.0753** (0.0259)	-0.0737** (0.0293)	-0.0740*** (0.0228)	-0.0798*** (0.0251)
CDU		-0.0148 (0.0398)		
Educational expenditure/gdp			-0.0579 (0.0602)	
High school graduates/population				10.89 (18.47)
Long term fees				0.00316 (0.0200)
Time Fixed Effects	YES	YES	YES	YES
State Fixed Effects	YES	YES	YES	YES
N	1986	1986	1986	1986

Further Covariates: female, migration, parents university, household equivalent income and unemployment/vacancies

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Appendix - Robustness: Probit Model

Dependent variable: Intention to acquire a university degree

	Full Sample	Reference				
		Poorest 10%	Poorest 20%	Poorest 30%	Male	Parents w/o uni degree
Tuition	-0.184* (0.0944)	-0.658*** (0.236)	-0.499*** (0.138)	-0.385*** (0.115)	-0.187** (0.0908)	-0.200** (0.100)
Higher income		0.244* (0.134)	0.192* (0.0989)	0.193** (0.0978)		
Tuition*		0.527** (0.237)	0.428*** (0.133)	0.321*** (0.115)		
Higher income						
Male*Tuition					0.00661 (0.0635)	
Parents University* Tuition						0.0626 (0.177)
Time Fixed Effects	YES	YES	YES	YES	YES	YES
State Fixed Effects	YES	YES	YES	YES	YES	YES
N	1955	1955	1955	1955	1955	1955

Further Covariates: Female, Migration, Mother university, Household equivalent income and Unemployment/Vacancies

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$