Schumpeter School of Business and Economics

The role of primary school catchment areas for ethnic school segregation. Evidence from a policy reform

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WIB Wuppertaler Institut für bildungsökonomische Forschung

North Rhine- Westphalia (NRW)

Capital	Düsseldorf
Surface area	34,068 km^2
Inhabitants	17.89 million (Germany: 81.7 million)

School choice in North Rhine–Westphalia (NRW), Germany

- Until the 2008/09 school year: Primary school catchment areas
- No parental school choice, attendance of an **assigned** primary school
- A strict regulation? No, because
  - Different types of primary schools (public and public denominational)
  - In addition: Apply to another than the assigned school
  - Not uncommon to opt out of the assigned school (Kristen 2005; Riedel et al. 2010; Schneider et al. 2012)

Why have school catchment areas been abolished?

- Increase parental school choice and foster competition between schools
- More competition, higher quality of schooling, increases in academic achievement also for disadvantaged groups (e. g. Hoxby 2003; Figlio/Hart 2010; Hastings/Weinstein 2008)
- In addition: Voting by feet simplifies the decision which school to close

→ By the 2008/09 school year: Abolition of school catchment areas

What happened after catchment areas have been abolished?

- Discussion about a possible increase in **ethnic segregation**
  - School choice depends on parents' ethnic/economic status (e. g. Bifulco/Ladd/Ross 2009;
  - Söderström/Uusitalo 2010; Riedel et al. 2010; Schneider et al. 2012)
  - Segregation affects students' achievement/opportunities (e. g. Hanushek/Kain/Rivkin 2009; Cullen/Jacob/Levitt 2005)
- Federal state elections resulted in a new government which again modified the school law
  - Since 2010 the municipalities are allowed to reintroduce school catchment areas

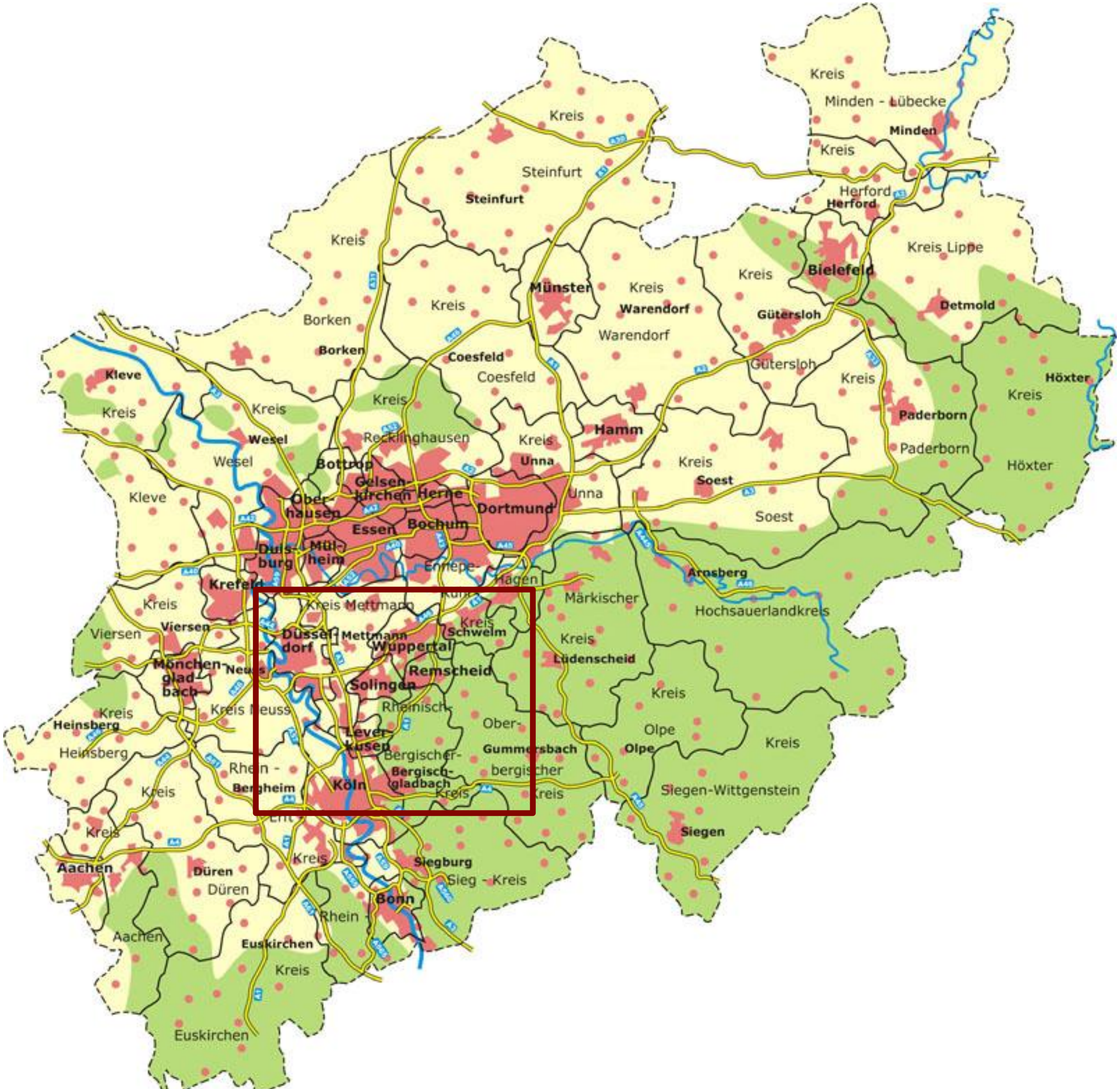
School choice in Germany

- Although there is primary school choice there is only little research and evidence on
    1. determinants of choice
    2. level of segregation and changes in segregation
- Why?
    - School choice is not a prominent issue
        - assumption that there is no school choice
        - focus on track choice
        - limited data (Riedel et al. 2010; Schneider et al. 2012)

Part 1. The determinants of choice

- Use **individual level** data for one city/region
- Use data before and after abolishing school districts
- Get socioeconomic data at the individual or the city block level
- Use administrative data to
  - avoid sample selection
  - be cost efficient

NRW



Kreis
Minden - Lübbecke
Minden
Herford
Steinfurt
Münster
Warendorf
Bielefeld
Kreis Lippe
Detmold
Gütersloh
Borken
Kleve
Wesel
Coesfeld
Recklinghausen
Hamm
Unna
Paderborn
Höxter
Soest
Bottrop
Gelsenkirchen
Herne
Oberhausen
Dortmund
Essen
Bochum
Duisburg
Mülheim
Krefeld
Hagen
Märkischer
Hochsauerlandkreis
Arnsberg
Viersen
Kreis Mettmann
Düsseldorf
Wuppertal
Schwelm
Lüdenscheid
Mönchengladbach
Neuss
Remscheid
Solingen
Olpe
Heinsberg
Leverkusen
Gummersbach
Siegen-Wittgenstein
Bergheim
Köln
Bergisch-Gladbach
Siegen
Aachen
Düren
Siegburg
Sieg - Kreis
Bonn
Euskirchen

Wuppertal

- 350,000 inhabitants
- 48 public primary schools
- 11 public Catholic schools
- 2 public Protestant schools
- 23 percent Catholics; 35 percent Protestants
- Unemployment rate 2007: 12.5 percent
- Welfare dependency rate: 16.5 percent

Above regional and national level

The data

- **Student level**
  - student address
  - denomination
  - nationality (German, non-German)
- **School statistics:**
  - percentage non-German students
  - denomination
  - transfer rate to academic track school (average 2004-2006)
- **City block / school district level**
- nationality and numerous other socio-economic variables

The data

- Focus on
  - Turkish students; measurement problem due to nationality law
  - Muslim students; more stable

which are the largest non-German groups among students in Germany

Determinants of school choice (All schools, FE-Model)

	All	Non-Muslims	Muslims
Distance to assigned school (in 100 m)	0.012**	0.0103**	0.0130*
Schools within a radius of 1 km	0.0329**	0.0208+	0.0052
Schools within a radius of 2 km	0.0172	0.02	-0.0048
% Turkish population in city block(a)	-0.0011		
Transfer rate to academic track	0.0244**	0.0165**	0.0133
Distance to school with 5 PPT higher transfer rate	-0.0041	0.0019	-0.0052
Distance to school with 5 PPT less migrants	0.0005	-0.0039	-0.0018
Muslim	-0.0777**		
Year=2008	0.038*	0.0612**	0.0192
Observations	8,991	5,639	1,518
R^2	0.227	0.152	0.071

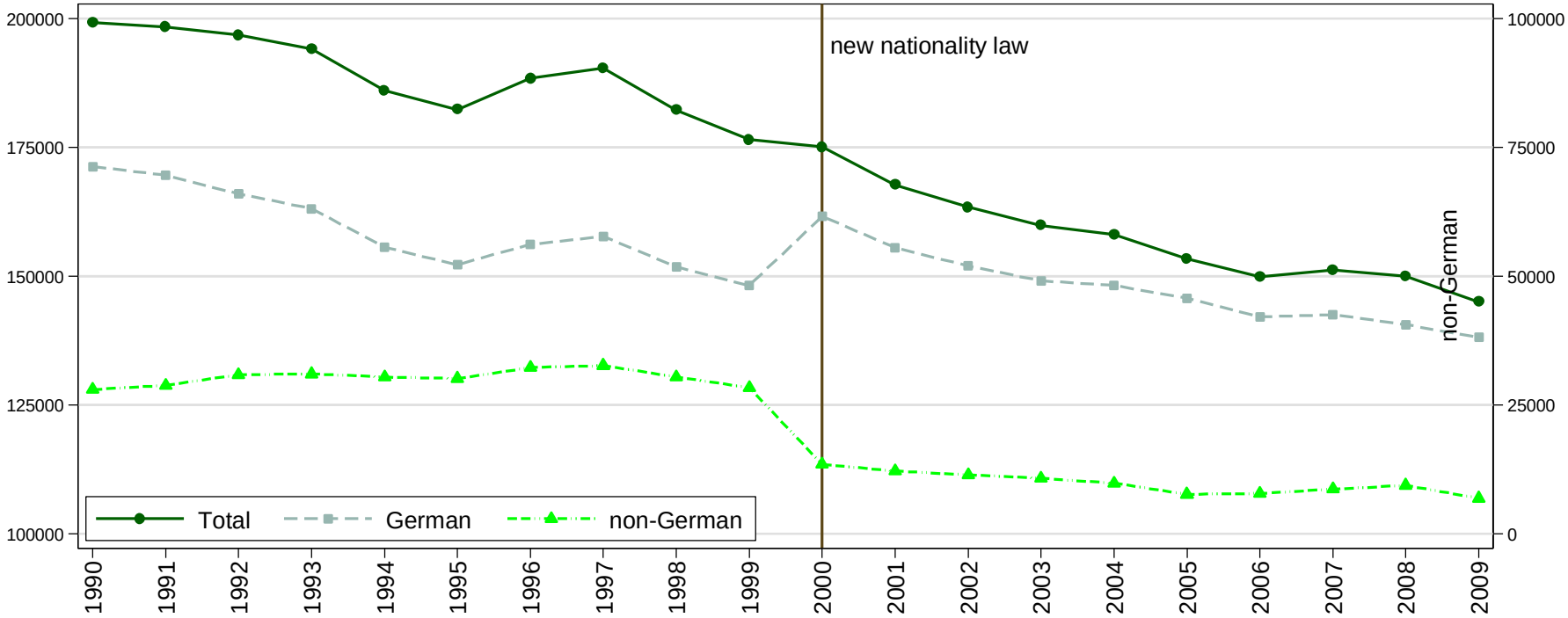
2. School catchment areas and segregation

- How does ethnic segregation change over time?
  - Consider: Turkish population, Muslims
- Segregation remains constant in Wuppertal
- I this also true for other municiplaties in NRW?
- Data for municipalities in NRW: 2003/4-2010/11

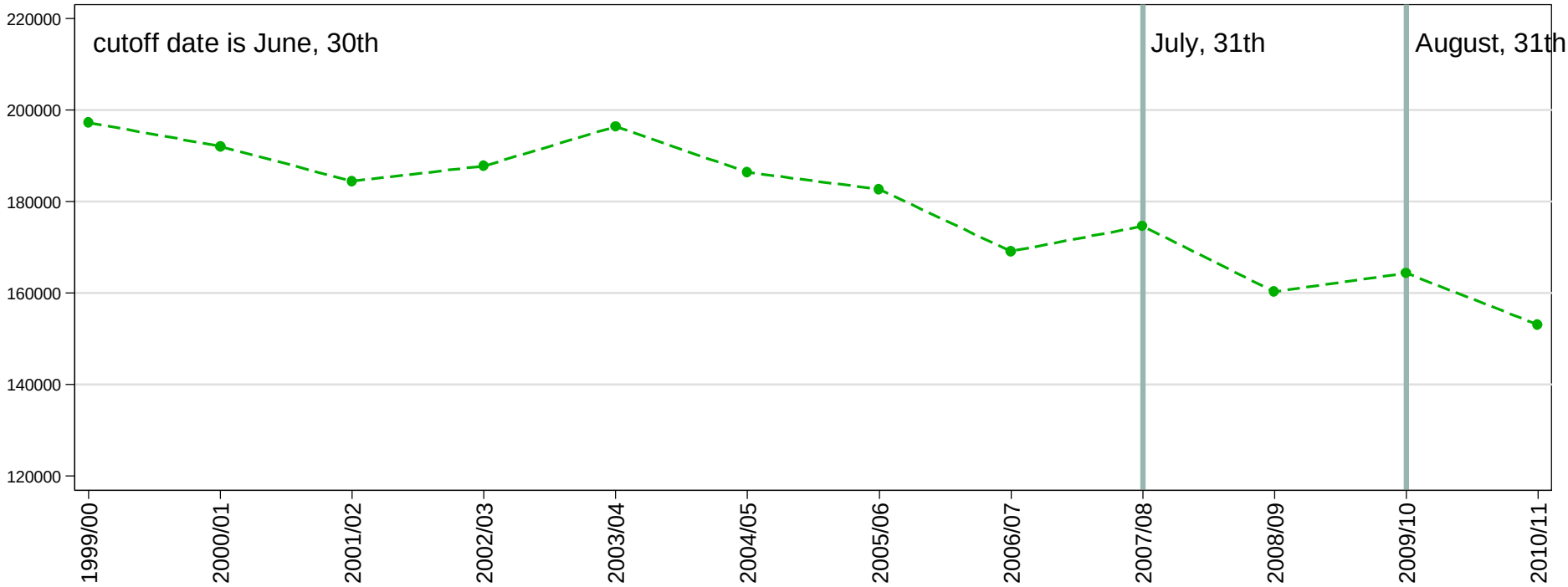
- …but besides school choice, why can segregation change?

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
No school districts					(x)	x	x	x
New nationality law				x	x	x	x	x
Cutoff date					x		x	
Falling birth rates	x	x	x	x	x	x	x	x

Total number of births in North Rhine-Westphalia from 1990 to 2009



Cut-off date and demographic change: Enrolments in Primary Schools



Data

- Administrative data (official school statistics) provide at least information on the composition of primary schools ➡ **use school statistics to analyze the**
  - **level of ethnic segregation** before and after school catchment areas were abolished
- Analysis **limited**
  - no individual information and no address data
  - no information on the nearest or chosen school
  - no information on social status **only** ethnic origin
  - analysis can show whether the composition of the students body by ethnicity has changed

- Administrative data (official school statistics) on all primary schools and for 8 school years
- Focus on ethnic segregation in primary schools and changes in segregation over time for
  - Turkish and
  - Muslim students

  which are the largest non-German groups among students in Germany
- To do
  - Calculation of common segregation indices
  - Descriptive trend analysis for all municipalities
  - Regression models to explain differences in segregation between municipalities

The data

	Number of schools							
School year	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
All primary schools	3,415	3,414	3,408	3,400	3,355	3,249	3,195	3,144
public schools	2,194	2,192	2,189	2,185	2,161	2,104	2,082	2,048
catholic schools	1,101	1,101	1,097	1,093	1,070	1,023	987	968
protestant schools	94	94	94	93	91	84	82	82

	Students in 1st grade							
School year	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
Students in primary schools	191,112	187,452	184,280	174,310	175,615	161,783	164,873	153,101
non-German	28,556	29,043	28,999	23,711	20,925	18,028	18,055	16,719
Turkish	15,117	15,455	15,308	11,457	9,509	7,448	7,154	6,256
Muslim	24,318	25,490	26,179	24,758	25,907	23,967	25,052	24,168
% non-German	*14.9*	*15.5*	*15.7*	*13.6*	*11.9*	*11.1*	*11.0*	*10.9*
% Turkish	*7.9*	*8.2*	*8.3*	*6.6*	*5.4*	*4.6*	*4.3*	*4.1*
% Muslim	*12.7*	*13.6*	*14.2*	*14.2*	*14.8*	*14.8*	*15.2*	*15.8*

Index of dissimilarity (D)

$$D = \frac{1}{2} \sum_{schools} \left| \frac{\text{German students}_{school}}{\text{German students}_{municipality}} - \frac{\text{non-German students}_{school}}{n\text{on-German students}_{municipality}} \right|$$

'The proportion of one group that would have to re-locate to generate no segregation (equal distribution)'

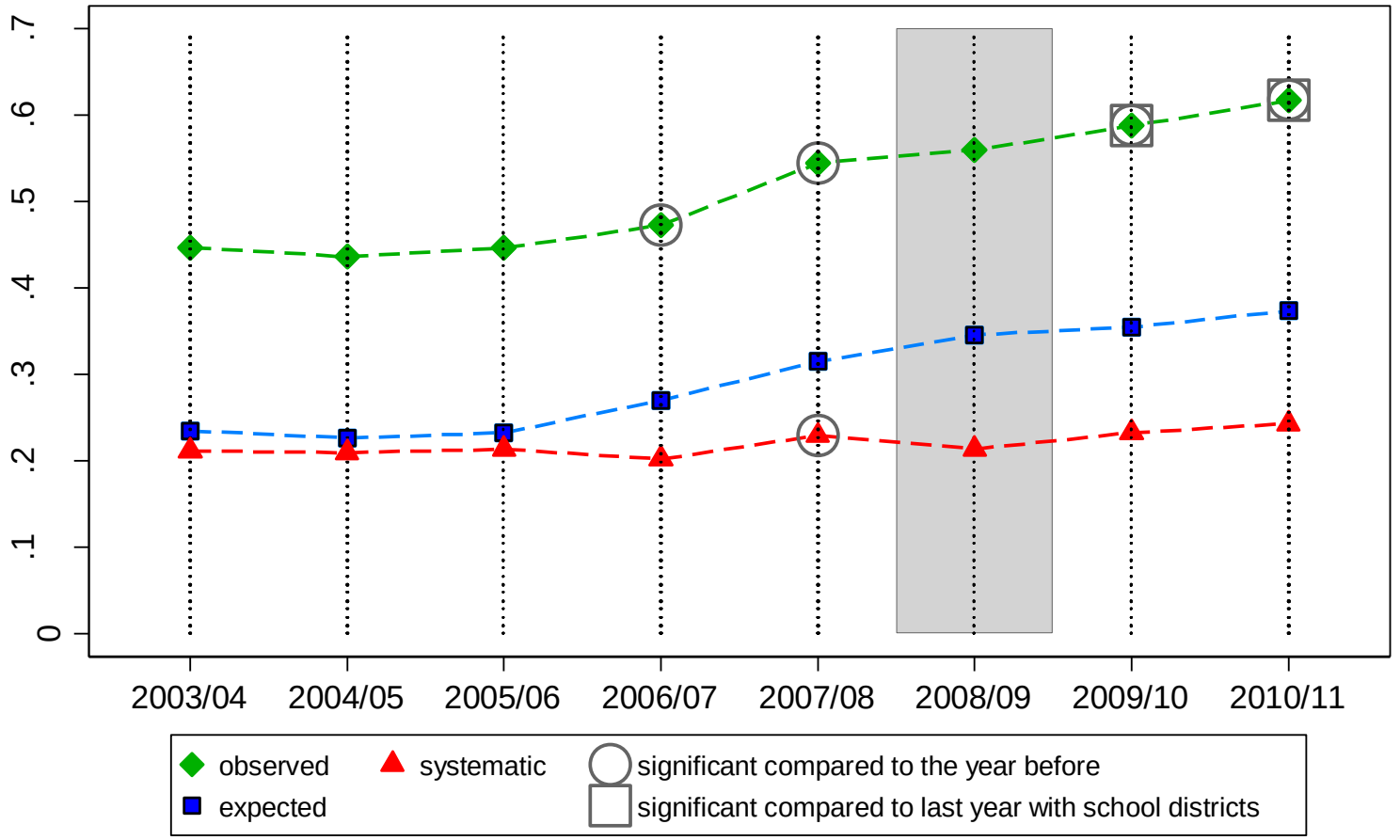
Relative index:

- 0 means no segregation
- 1 means complete segregation

- Problem: small sample (school) sizes and small minority shares affect *D* and **all common segregation indices**
- Solution: We calculate the expected segregation under random allocation of students , D_t^* (Carrington/Troske, 1997)
- random allocation of students to schools in each municipality (keeping school size constant)
- calculation of *D* for this random allocation
- Index of systematic segregation

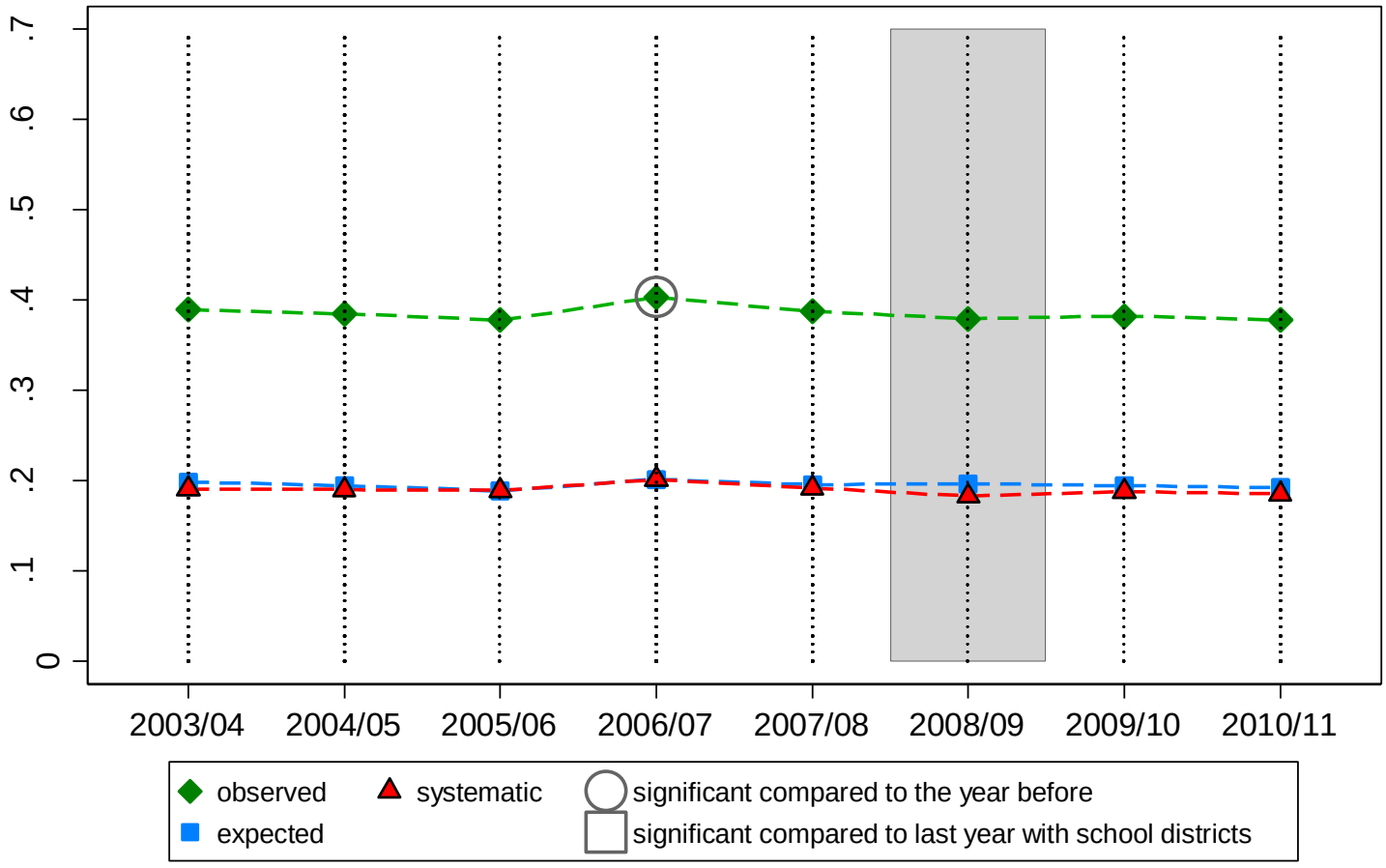
$$\hat{D}_t = D_t - D_t^*$$

Segregation



Turkish vs. German students

Segregation



Muslim vs. non-Muslim students

Models for systematic segregation, Turkish vs. German students (first differences)

	First differences				Before/After
	(1)	(2)	(3)	**(4)**	(5)
Year = 2004/05	0.0149	-0.0094	-0.0105	**-0.0129**	
Year = 2005/06	0.0192	0.0014	0.0003	**-0.0007**	
Year = 2006/07	0.0046	0.0165	0.0156	**0.0188**	
Year = 2007/08	0.0423**	0.0369**	0.0380**	**0.0393****	
Year = 2008/09 (base)					
Year = 2009/10	0.0379**	0.0155	0.0164	**0.0152**	
Year = 2010/11	0.0274	0.0242	0.0236	**0.0230**	
controls	no	yes	yes	**yes**	

Table cont.

		First differences			Before/After
	(1)	(2)	(3)	(4)	(5)
Share of Turkish students in municipality		1.1841***	1.1612***	**1.3747*** **	2.1360***
		(0.2463)	(0.2479)	**(0.2374)**	(0.3197)
log(Number of first graders in municipality)		0.1284+	0.1250+	**0.1236+**	0.2601**
		(0.0660)	(0.0667)	**(0.0631)**	(0.1087)
Denominational schools (1 = No)			-0.2228+	**-0.1812** **	-0.0370
			(0.1159)	**(0.0835)**	(0.1615)
School competition			0.0134	**0.0078**	0.0393
			(0.0307)	**(0.0282)**	(0.0356)
School heterogeneity			0.0773	**0.0759**	-0.0366
			(0.0520)	**(0.0469)**	(0.0847)
Ethnic heterogeneity (Rank)				**0.0011*** **	0.0008***
				(0.0001)	(0.0003)
School catchment areas (1 = Yes)					-0.0049
					(0.0073)
Constant	-0.0159	0.0040	0.0052	**0.0061**	0.0304***
	(0.0106)	(0.0118)	(0.0122)	**(0.0115)**	(0.0075)
Observations	1295	1295	1295	**1295**	370
Municipalities	185	185	185	**185**	185
R^2	0.011	0.054	0.065	**0.171**	0.177
Adjusted R^2	0.006	0.048	0.057	**0.163**	0.161

Models for systematic segregation, Muslim vs. Non-Muslim students (first differences)

	First differences				Before/After
	(1)	(2)	(3)	(4)	(5)
Year = 2004/05	0.0095	-0.0027	-0.0048	**-0.0049**	
	(0.0096)	(0.0105)	(0.0105)	**(0.0098)**	
Year = 2005/06	0.0088	-0.0023	-0.0041	**-0.0033**	
	(0.0092)	(0.0102)	(0.0104)	**(0.0088)**	
Year = 2006/07	0.0224**	0.0206**	0.0189+	**0.0204****	
	(0.0099)	(0.0101)	(0.0101)	**(0.0092)**	
Year = 2007/08	0.0018	-0.0122	-0.0138	**-0.0122**	
	(0.0116)	(0.0133)	(0.0133)	**(0.0117)**	
Year = 2008/09 (base)					
Year = 2009/10	0.0162	-0.0000	-0.0006	**-0.0000**	
	(0.0127)	(0.0141)	(0.0141)	**(0.0126)**	
Year = 2010/11	0.0084	0.0068	0.0064	**0.0060**	
	(0.0107)	(0.0108)	(0.0107)	**(0.0093)**	

Table cont.

	First differences				Before/After
	(1)	(2)	(3)	(4)	(5)
Share of Muslim students in municipality		0.4423***	0.4372***	**0.6222*** **	0.5589**
		(0.1470)	(0.1482)	**(0.1162)**	(0.2248)
log(Number of first graders in municipality)		0.1391***	0.1421***	**0.1279*** **	0.1032
		(0.0444)	(0.0450)	**(0.0383)**	(0.0706)
Denominational schools (1 = No)			-0.0129	**-0.0421**	0.0510
			(0.0348)	**(0.0491)**	(0.0758)
School competition			0.0321+	**0.0197**	0.0469**
			(0.0176)	**(0.0182)**	(0.0183)
School heterogeneity			0.0086	**-0.0008**	0.0497
			(0.0300)	**(0.0258)**	(0.0443)
Ethnic heterogeneity (Rank)				**0.0009*** **	0.0010***
				(0.0001)	(0.0002)
School catchment areas (1 = Yes)					-0.0024
					(0.0042)
Constant	-0.0103	0.0016	0.0039	**0.0019**	0.0039
	(0.0072)	(0.0089)	(0.0089)	**(0.0079)**	(0.0050)
Observations	1596	1596	1596	**1596**	456
Municipalities	228	228	228	**228**	228
R^2	0.004	0.023	0.025	**0.224**	0.267
Adjusted R^2	0.001	0.018	0.018	**0.218**	0.255

Conclusions & Outlook

- The option to choose is used by the families
- Families that are not disadvantaged choose more often (before and after 2008)
- Disadvantaged families benefit from choice
- The groups differ with respect to determinants of choice
- Segregation changes over time and there is a trend towards more segregation (Turkish vs. German students)
- Segregation increases **before** catchment areas were abolished

Conclusions & Outlook

- There are no **significant** differences in systematic segregation between years with and without catchment areas
  - catchment areas appear not to matter for segregation
  - reintroduction of catchment areas unnecessary?
- The amount of segregation depends on characteristics of the municipalities
- If some municipalities reintroduce school catchment areas
  - allows for better analysis of the importance of school catchment areas
  - true treatment and control group
- Redo analysis after families had time to learn choice
- The effect of choice appears to depend on the “culture” of school choice and the underlying institutions
- “International evidence” can be misleading

Thank you for your attention!

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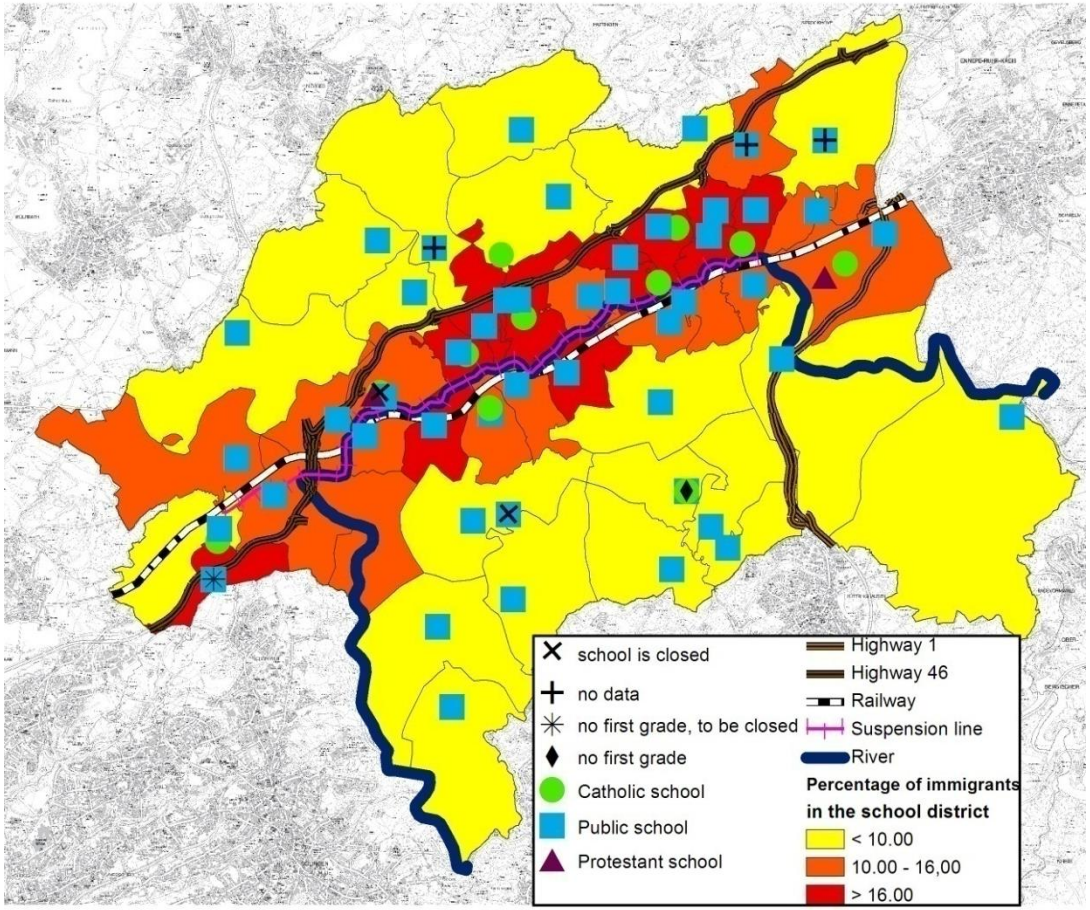
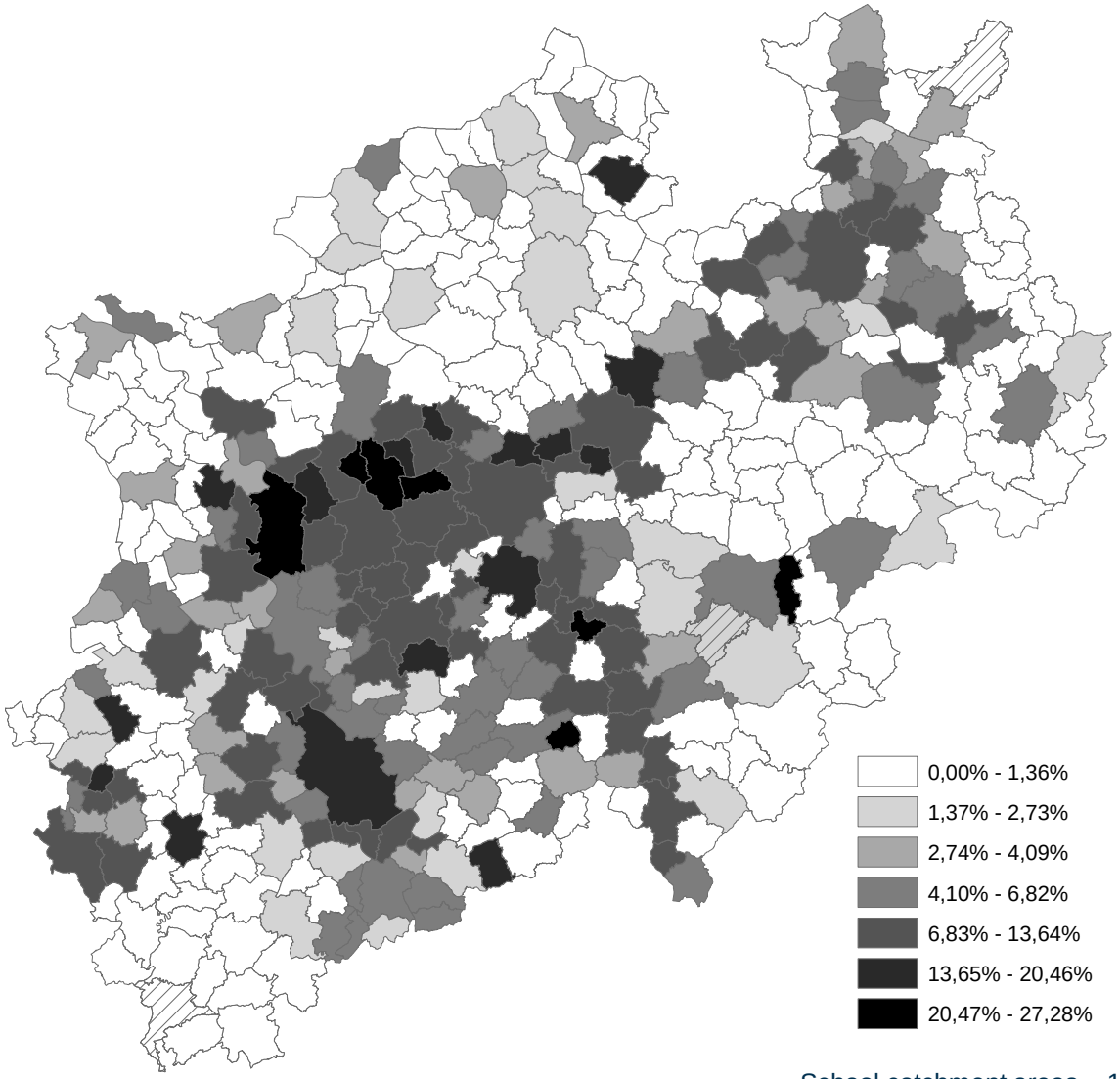
Wuppertal

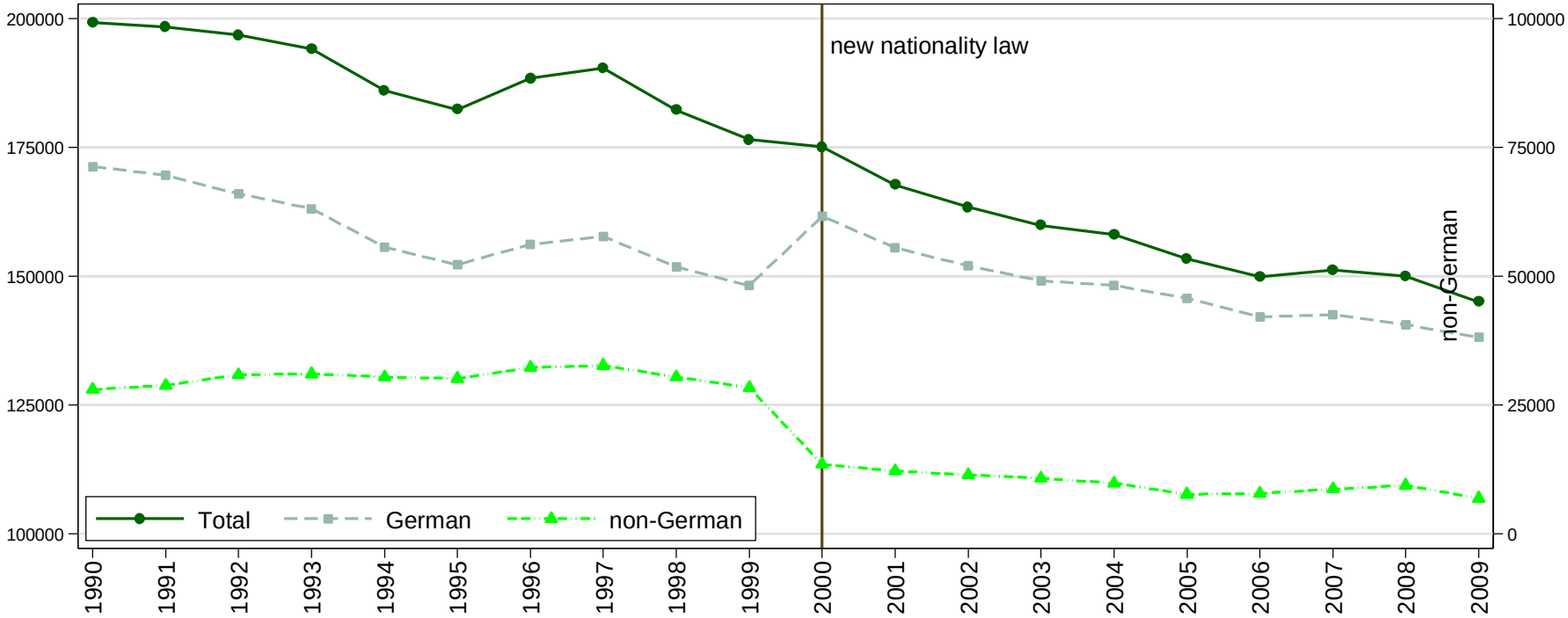

school is closed
no data
no first grade, to be closed
no first grade
Catholic school
Public school
Protestant school
Highway 1
Highway 46
Railway
Suspension line
River
Percentage of immigrants in the school district
< 10.00
10.00 - 16,00
> 16.00

Percentage of Turkish students in 1st grade in NRW, 2003/04



Shaded municipalities have < 5 primary schools and < 7 Turkish students.

Total number of births in North Rhine-Westphalia from 1990 to 2009



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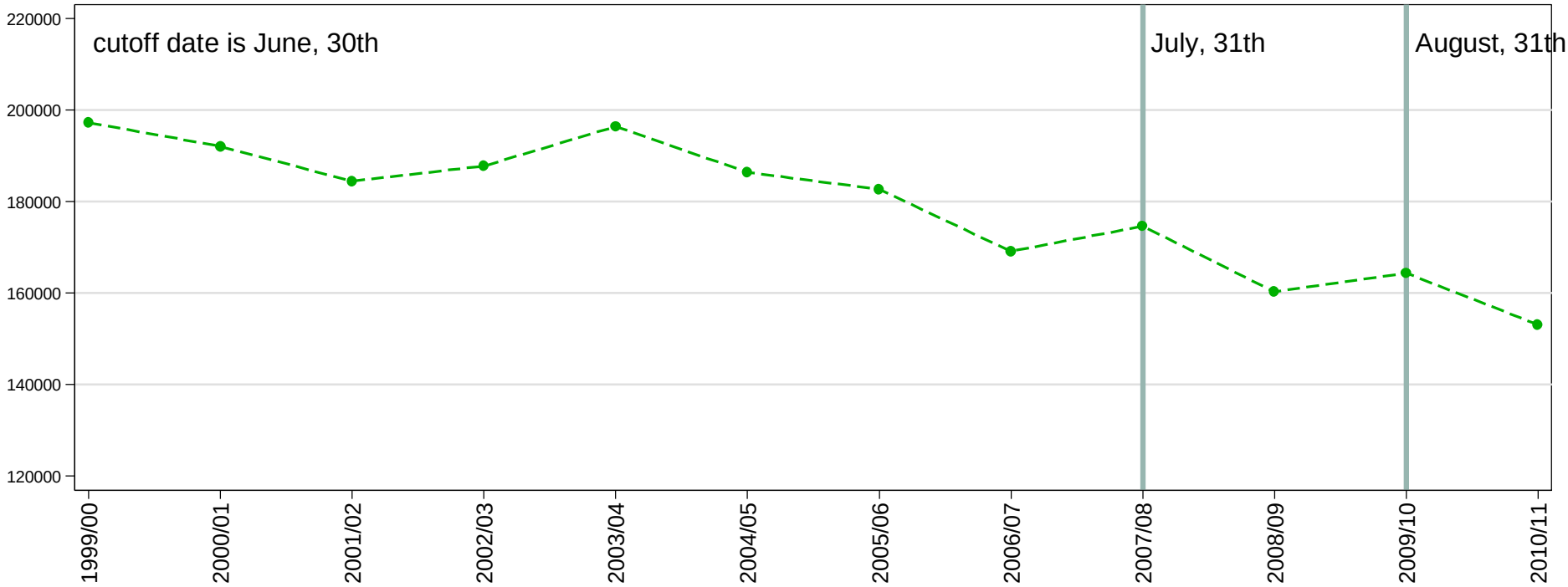
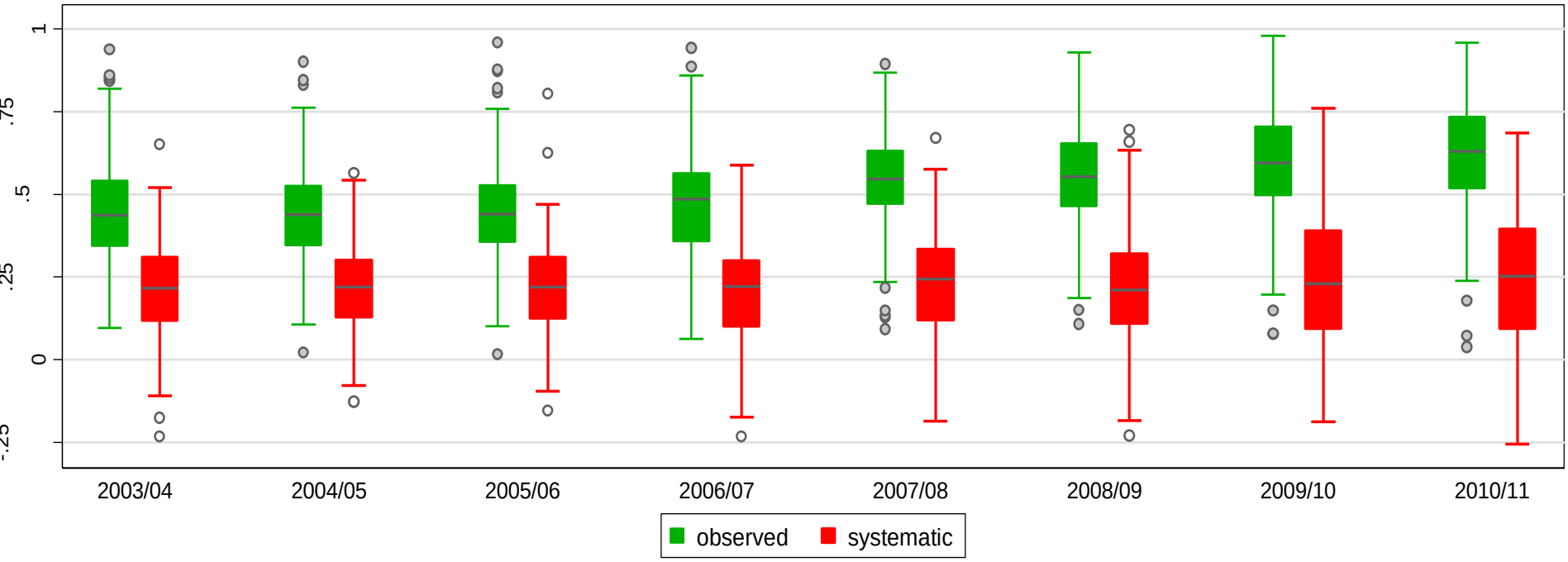
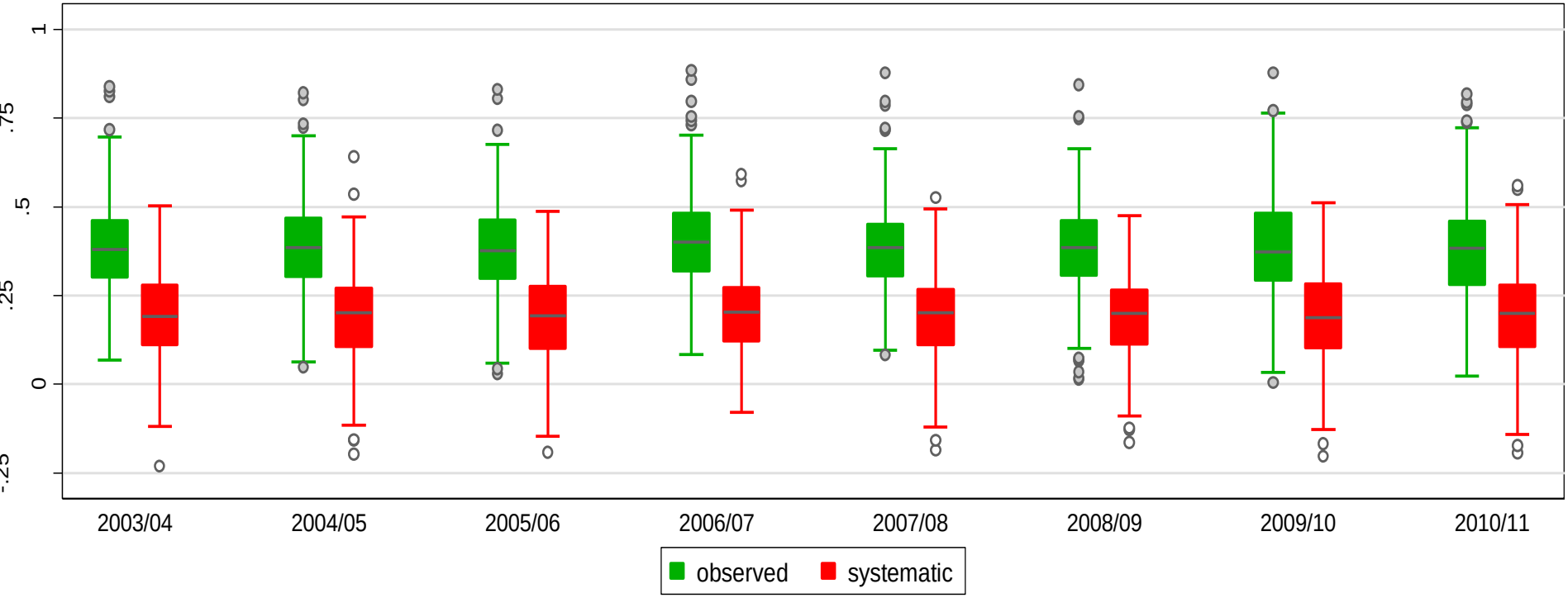


The results: Observed and systematic segregation



Turkish vs. German students

Note: Municipalities with only few schools and/or few minority students are excluded from the analysis



Muslim vs. non-Muslim students