Divided into progress!
How Europe's political and religious fragmentation spurred creativity: 1100—1900

Matías Cabello
Martin Luther University of Halle-Wittenberg

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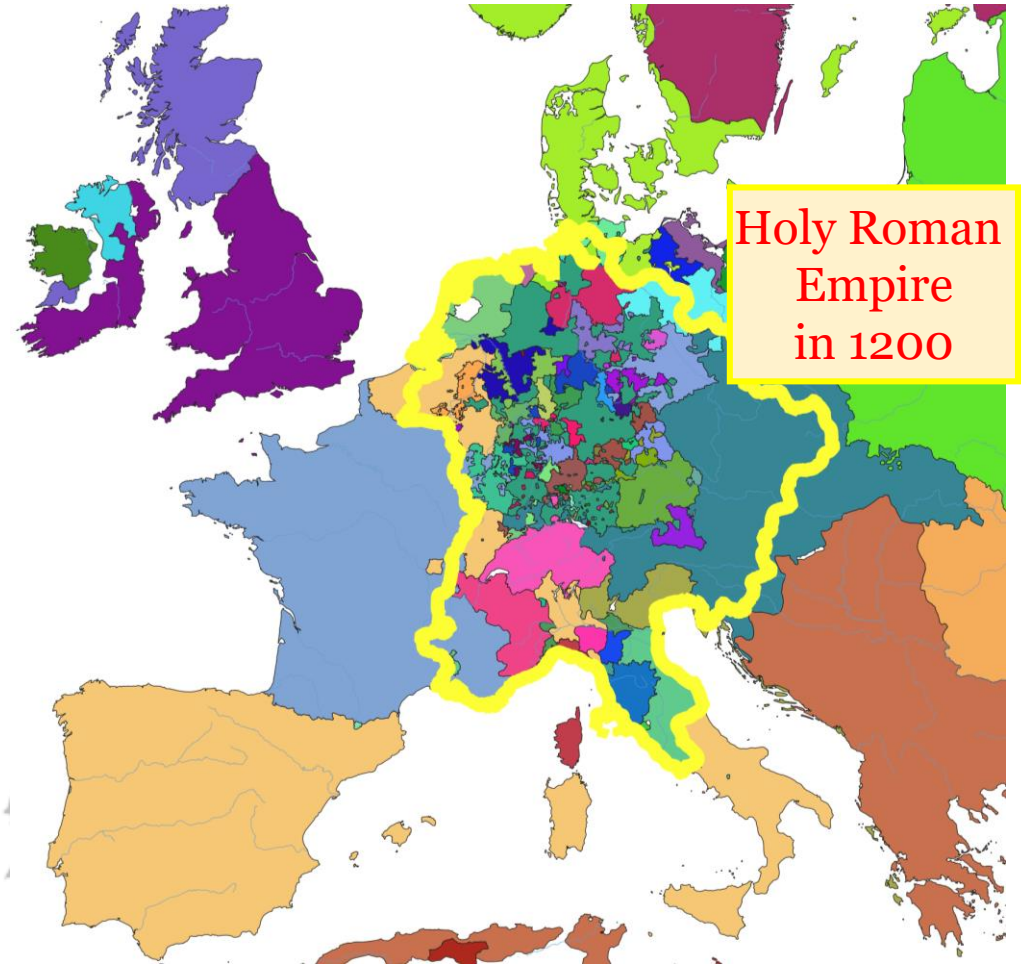
Europe's deeply-rooted fragmentation

- Rooted in the **HRE's legacy of weak power**.
- Manifested also religiously:
  - East–West Schism (1054)
  - Church vs. state (e.g. 12th cent. Investiture Controversies)
  - Western Schism (1378-1417)
  - Reformations (1517)



Europe ca. 1600

Fragmentation may *harm* creativity

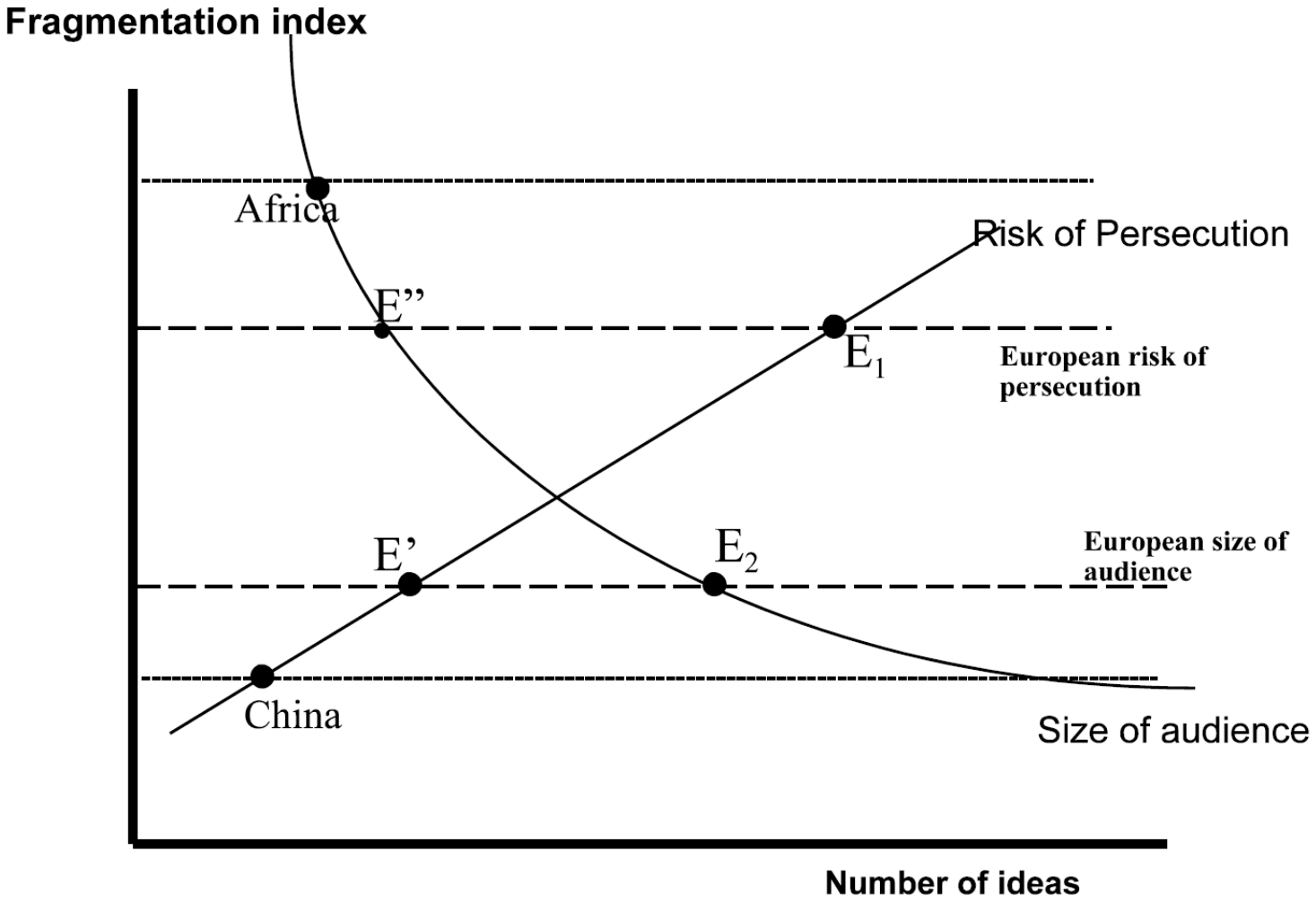
Political

- Fewer agglomeration effects
- Waste in wars and conflict

Religious

- Also possibly leading to intolerance, censorship, lack of communication.

Fragmentation may *spur* creativity



Europe's intellectual community > Europe's political unit size

Mokyr, J. The Market for Ideas and the Origins of Economic Growth in Eighteenth Century Europe. *Tijdschrift voor Sociale en Economische geschiedenis* **2007**, *4* (1), 3–38.

Fragmentation may *spur* creativity

Mechanism 1: Persecution-ineffectiveness

"… the political **fragmentation** of Europe … **made it almost impossible for rulers and organized religion to suppress heterodox ideas**. …

The main mechanism that made [The Enlightenment] possible was the capability of creative and original **thinkers and scientists** to **move around on the continent, so that no single ruler could control them**."

Mokyr, 2005, *Mobility, Creativity, and Technological Development*

Fragmentation may *spur* creativity

Mechanism 2: Peaceful competition channel

Examples:

- Jesuits vs. Jansenists competing education. Mokyr, 2017
- Dissenter academies in Britain. Mokyr, 2017
- "Columbus succeeded on his **fifth try** in persuading one of Europe's hundreds of princes to sponsor." Diamond, 2007
- "Europe's **disunity** stand in sharp contrast to those of China's **unity**. … [which] decided to halt other activities besides overseas navigation." Diamond, 2007

Did fragmentation *harm*/*spur* Europe's creativity?

(and through which channels?)

Data (Europe only)

- Per capita **creative individuals** and their fame. Appendix
  - *Intellectuals* (incl. *scientists*) and *artists*.
  - Wikidata, Wikipedia (Wasmer et al), RETE (de la Croix et al), Bairoch, Burigh.

- **Political fragmentation** within 100, 200, … , 500 km. Appendix
  - Cleaned Abrahmson 5-year panel; adapted Nüssli vector data
  - 19th cent.: Max Planck Institute for Demographic Research (MPIDR)

- **Religious fragmentation** within 50, … , 200 km. Appendix
  - Wikidata

Causal propositions

Prop. 1: *Fragmentation → Religious diversity*

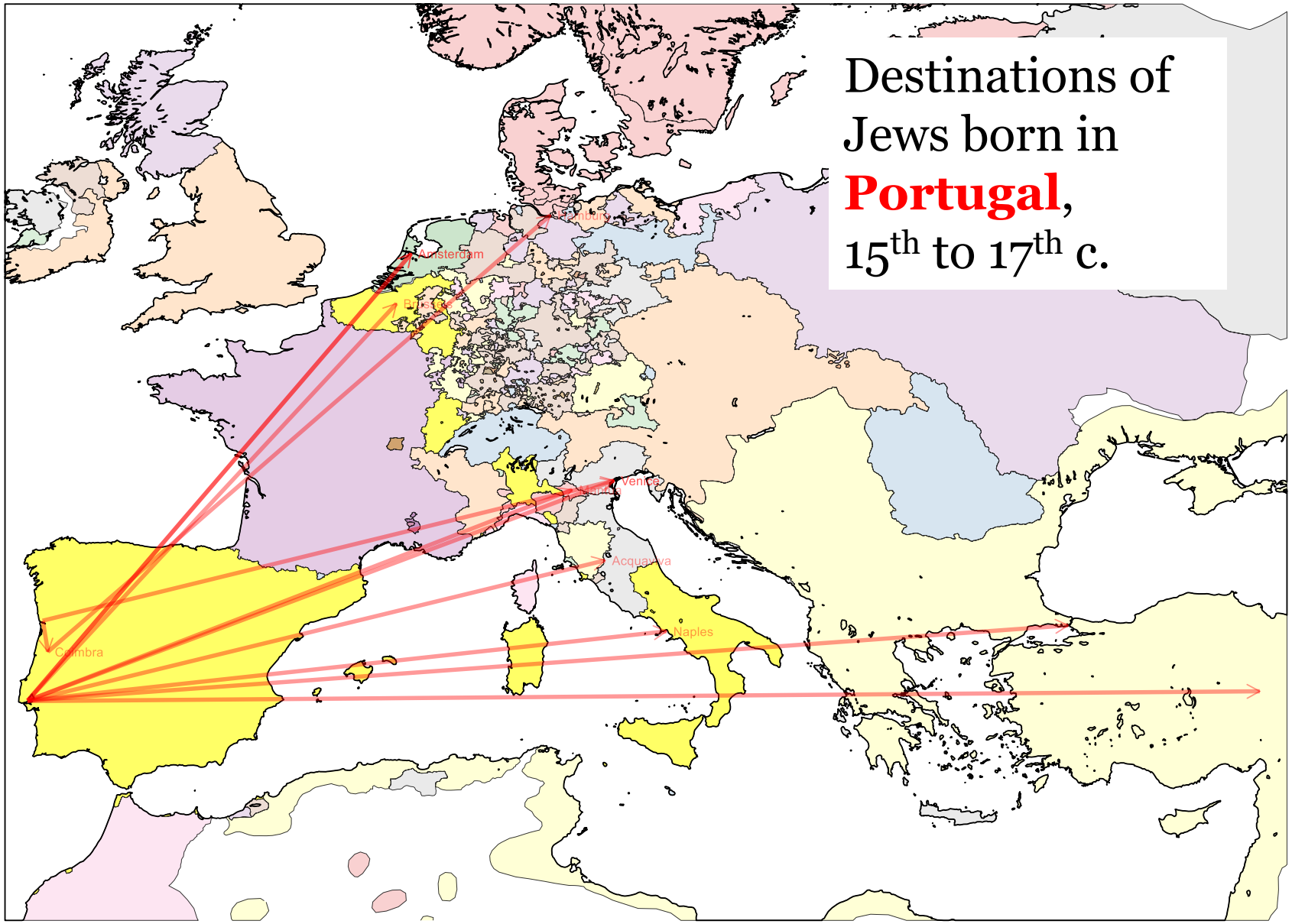
Prop. 1: *Fragmentation → Religious diversity*

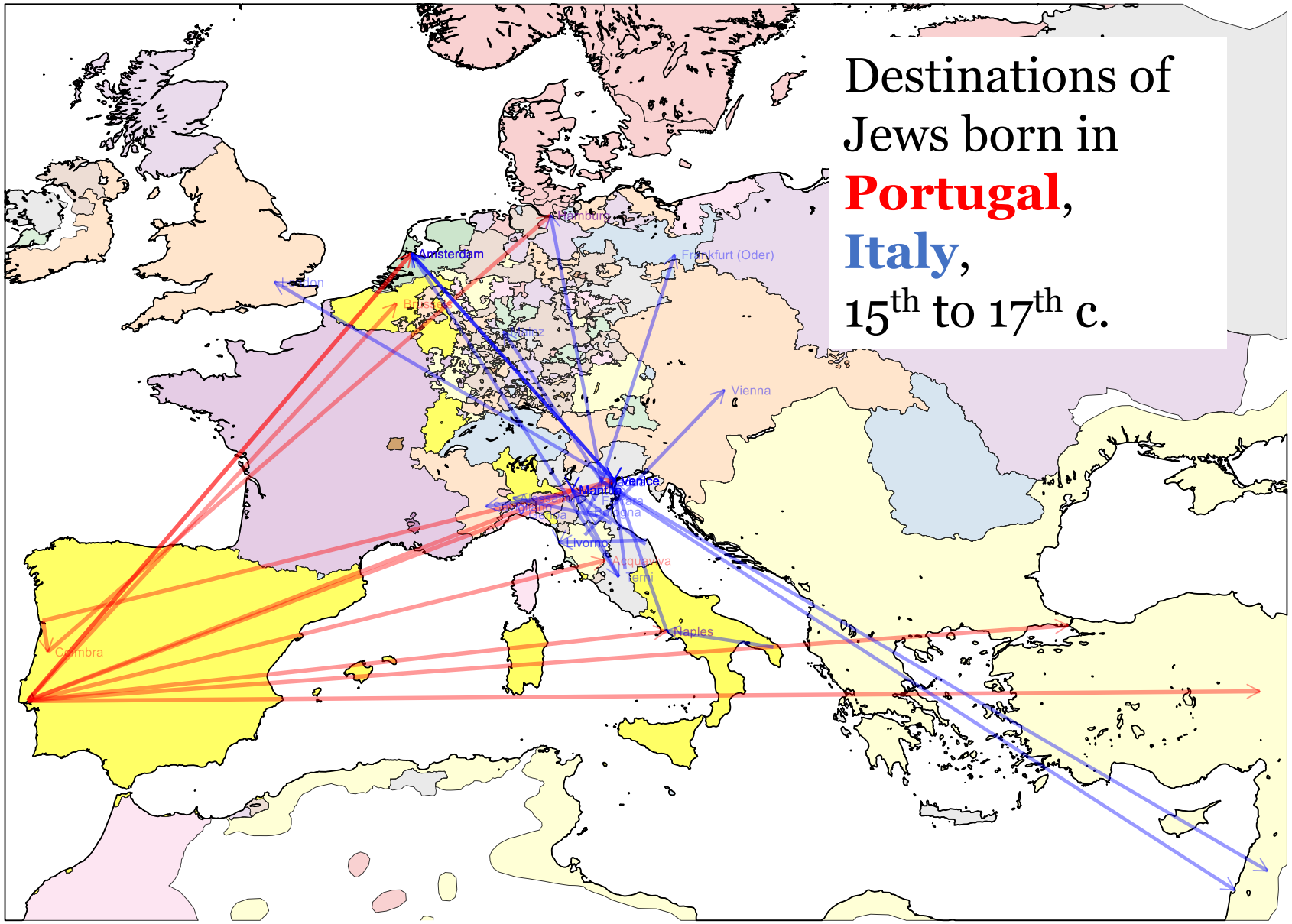
Why?

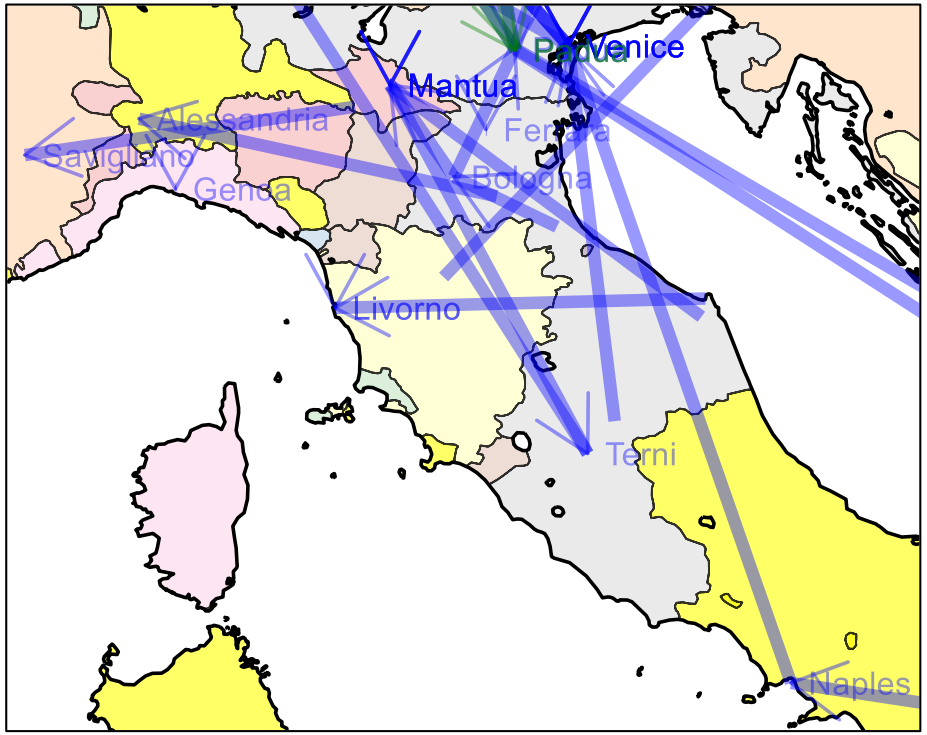
- Obvious after Reformation: *cuius regio, eius religio* ("whose realm, their religion")

- More generally:

  Pol. frag. → Religiously persecuted found shelter in nearby states (i.e. *within* the regional state system)

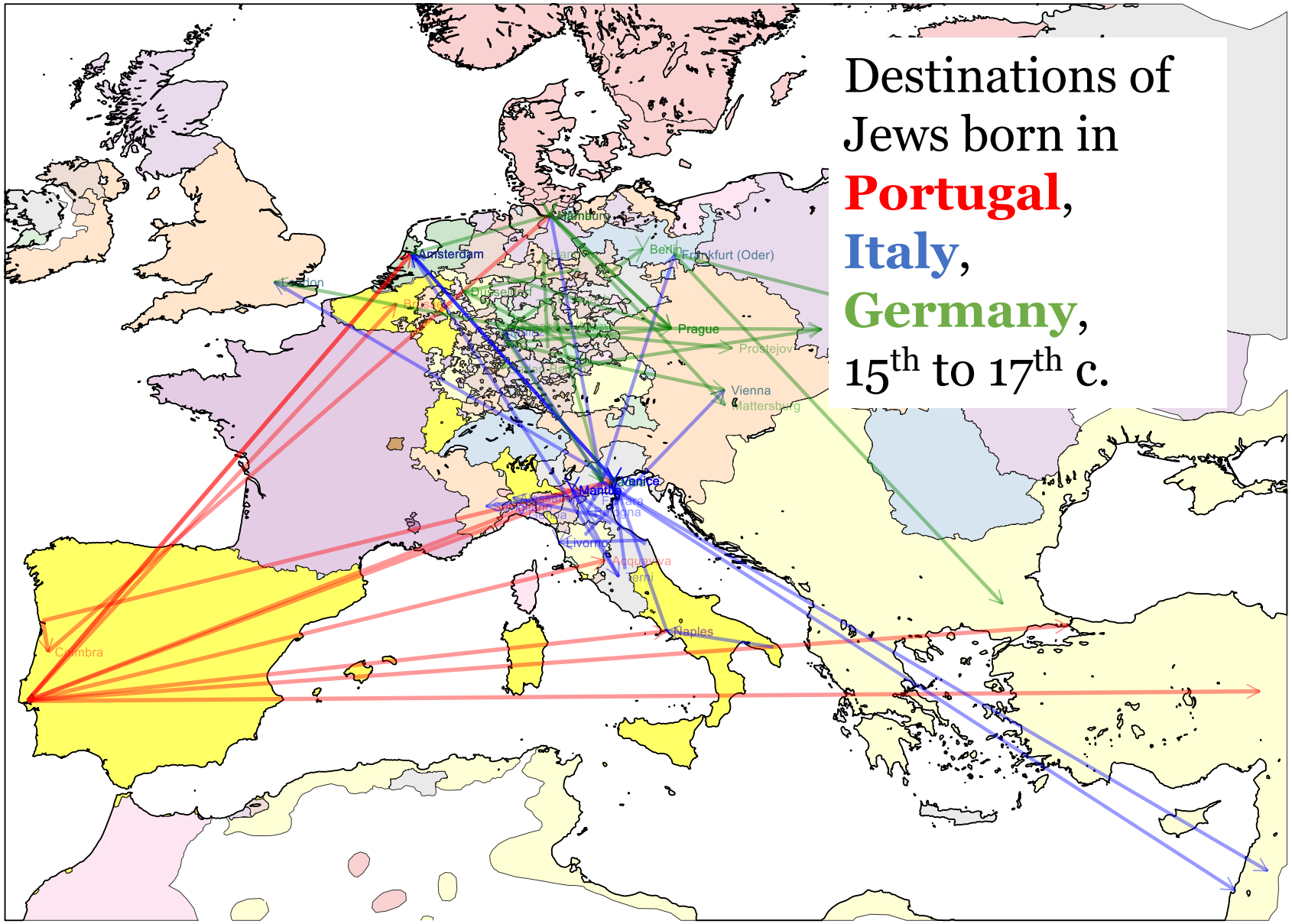

Destinations of Jews born in Portugal, 15th to 17th c.
Amsterdam
Venice
Naples
Coimbra
Boundaries of 1600


Destinations of Jews born in Portugal, Italy, 15th to 17th c.
Amsterdam
Hamburg
Frankfurt (Oder)
London
Vienna
Venice
Mantua
Livorno
Naples
Coimbra
Boundaries of 1600



Many *stayed* within the Italian states *system*.

The same applies to the German states system …



Boundaries of 1600

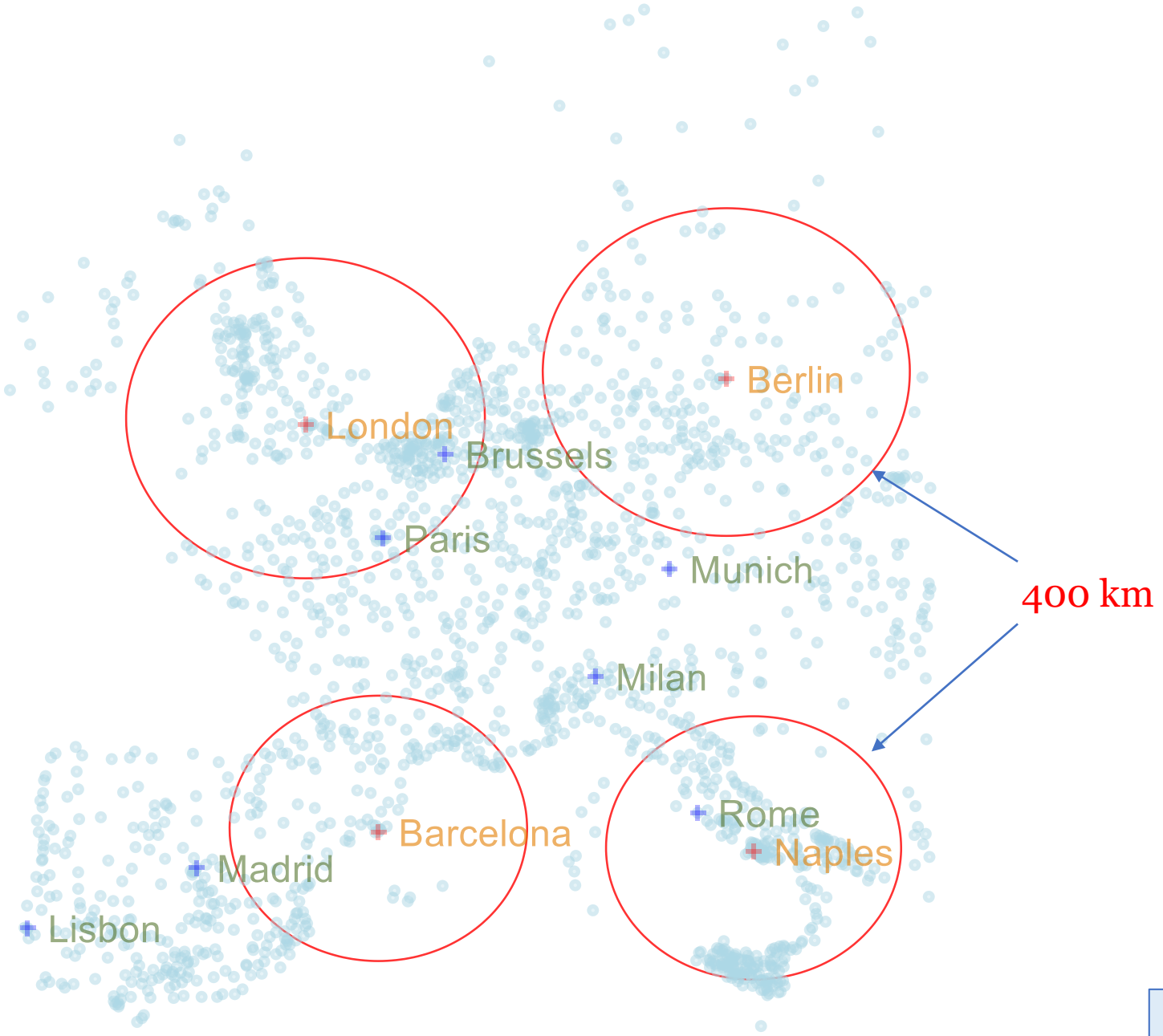
Prop. 1: *Fragmentation → Religious diversity*

local

Dependent variable: Religious diversity within 50km	Period			
System	1100–1550	1560–1690	1700–1790	1800–1900
State fragmentation (400km)	$0.21^{\bullet}$	0.06^{***}	0.03^{*}	$0.11^{\bullet}$
Dep. variable in $t-100$	✓	✓	✓	✓
Full controls	✓	✓	✓	✓
Observations	1990	4098	4320	4908
R-squared	0.37	0.45	0.50	0.54

Notes: Population-weighted, city-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population of the city, the number of cities and their population within 400 km, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, $^{\bullet}$ $p < 0.00000001$

Robustness


Berlin
London
Brussels
Paris
Munich
400 km
Milan
Rome
Naples
Barcelona
Madrid
Lisbon

Prop. 2: *Fragmentation → Universities*

Prop. 2: *Fragmentation → Universities*

local

Dependent variable: Universities within 50km	Period			
System	1100–1550	1560–1690	1700–1790	1800–1900
State fragmentation (400km)	0.08•	0.08•	0.07***	0.11•
Dep. variable in $t-100$	✓	✓	✓	✓
Full controls	✓	✓	✓	✓
Observations	89286	27174	19410	19410
R-squared	0.55	0.66	0.81	0.60

Notes: Population-weighted, city-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population of the city, the number of cities and their population within 400 km, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, • $p < 0.00000001$

Robustness

Prop. 2: *Fragmentation → Universities*

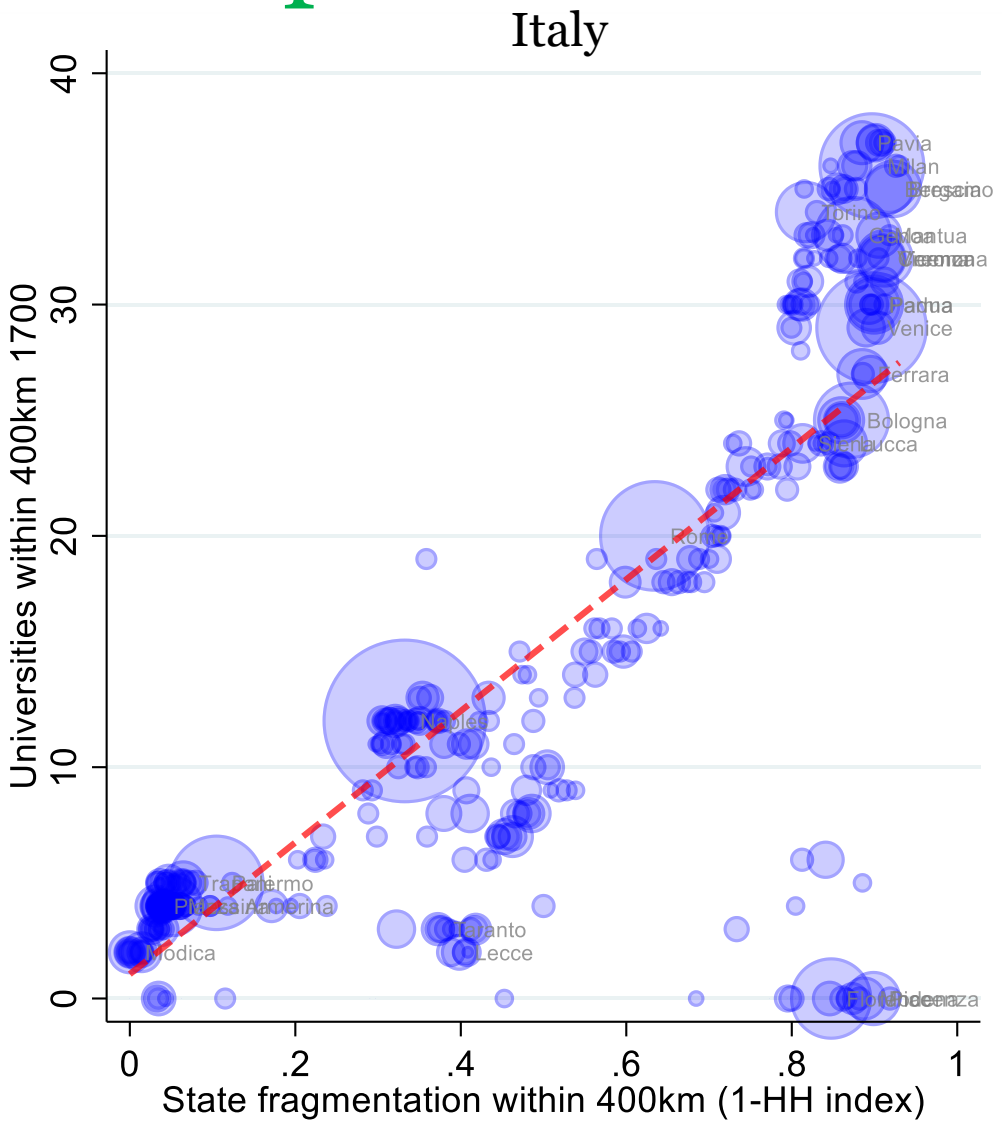
Why?

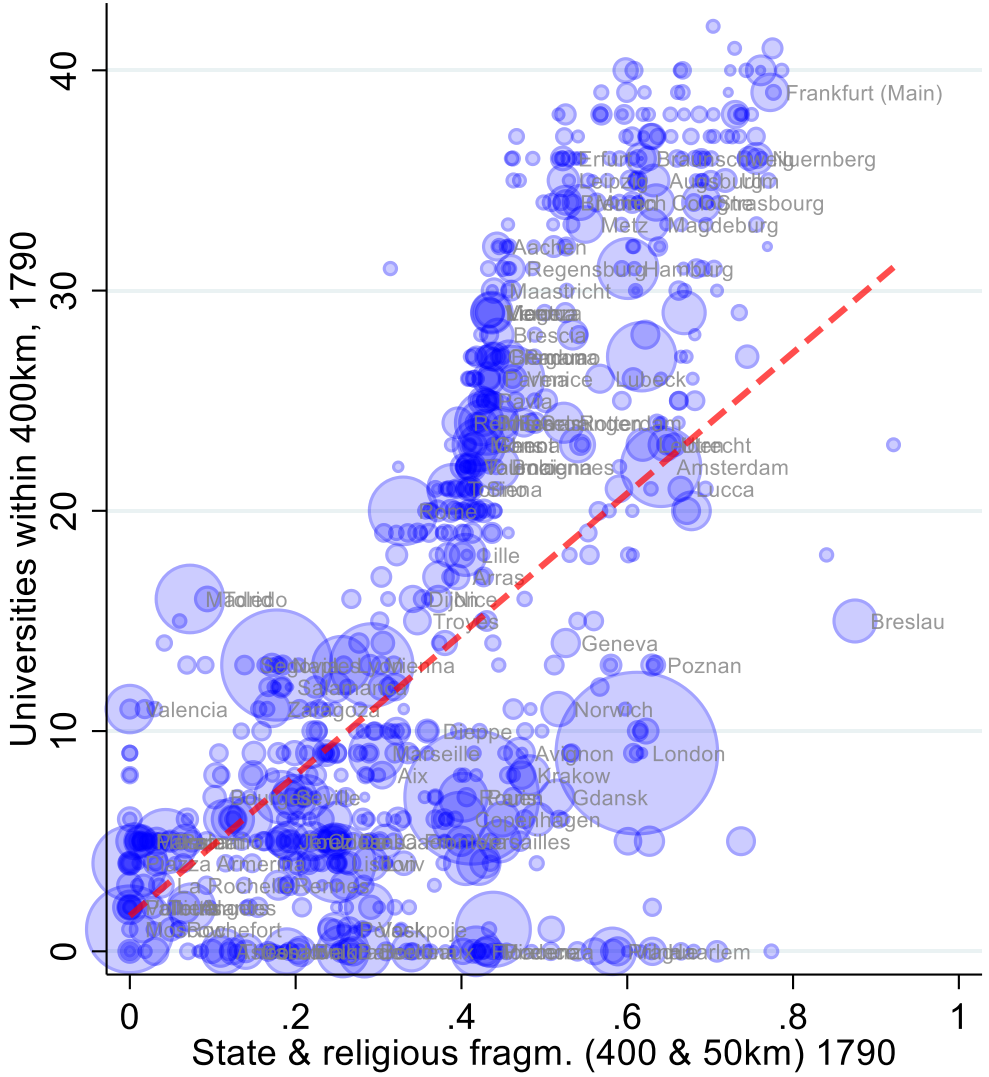
Religious/state fragmentation → Universities obvious after the Reformation (*cuius regio, eius religio*).

But why also before?

- States need bureaucrats,
  … ideally their *own* bureaucrats → Universities founded — Examples
- Prestige state competition → Universities founded
- Papal Schism 1378-1417 → Universities founded — Examples
- Charters as *intra-state* monopolies → Universities **blocked** — Examples

Universities vs fragmentation: competition channel!





Prop. 3: *Fragmentation → Creativity*

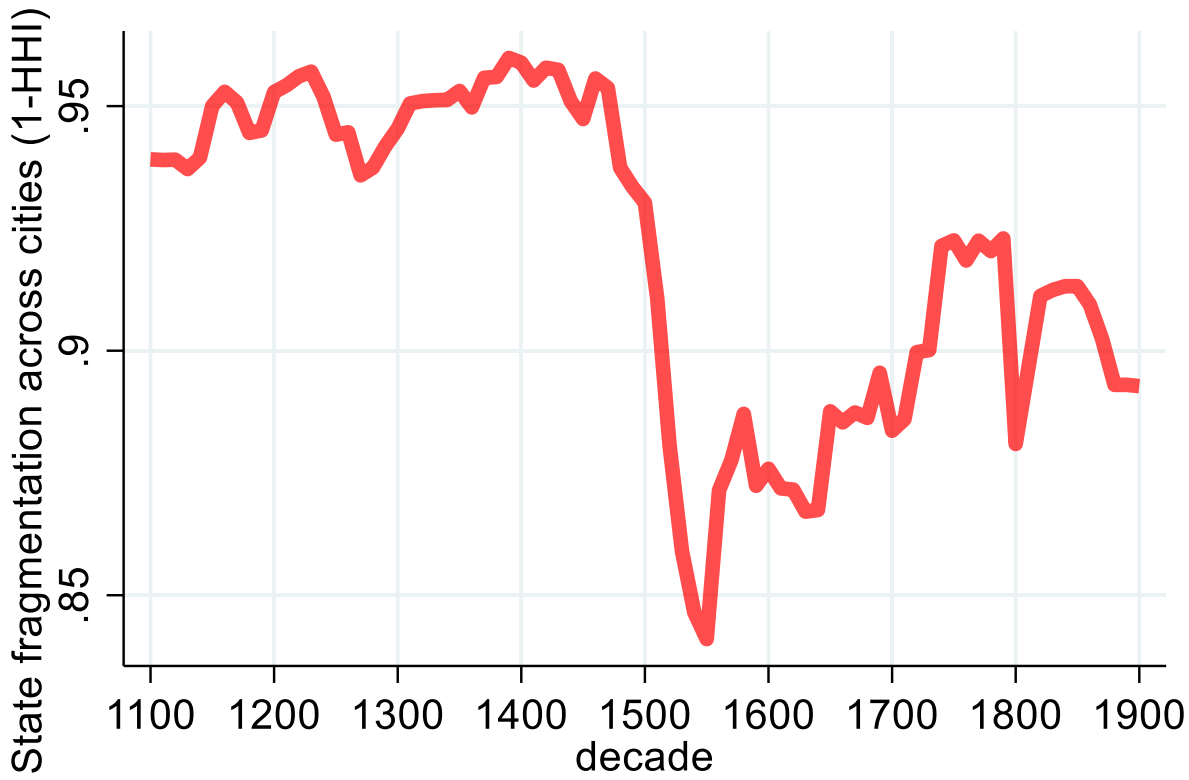
Prop. 3: *Fragmentation → Creativity*

Dependent variable: Creatives' biographies p.c.				
	Period			
	1100–1550	1560–1690	1700–1790	1800–1900
State fragmentation (400km)	0.97•	0.46•	0.77•	0.55•
Dep. variable in $t-100$	✓	✓	✓	✓
Full controls	✓	✓	✓	✓
Observations	7543	10629	9891	12716
R-squared	0.41	0.35	0.50	0.56

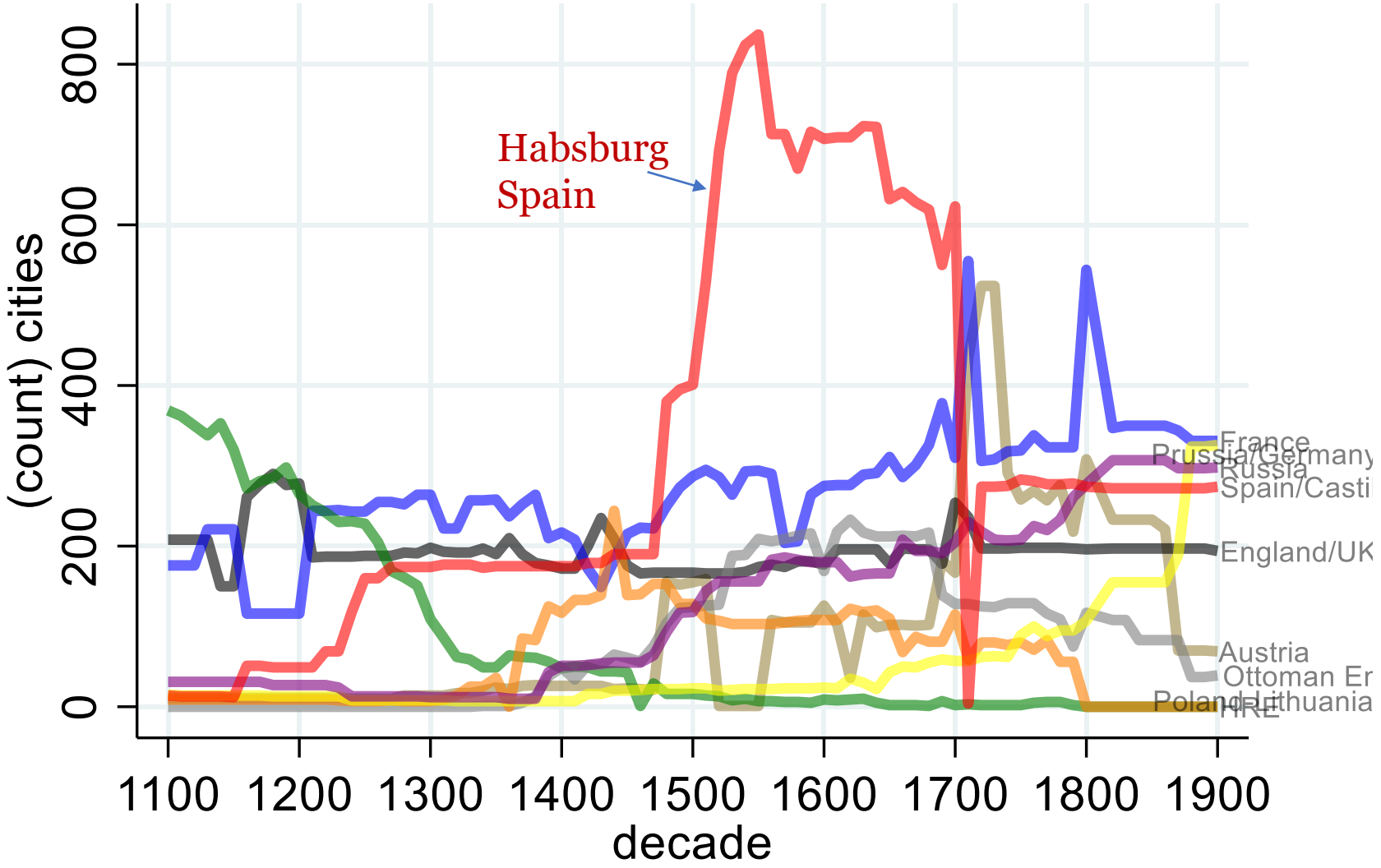
Notes: Population-weighted, city-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population of the city, the number of cities and their population within 400 km, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, • $p < 0.00000001$

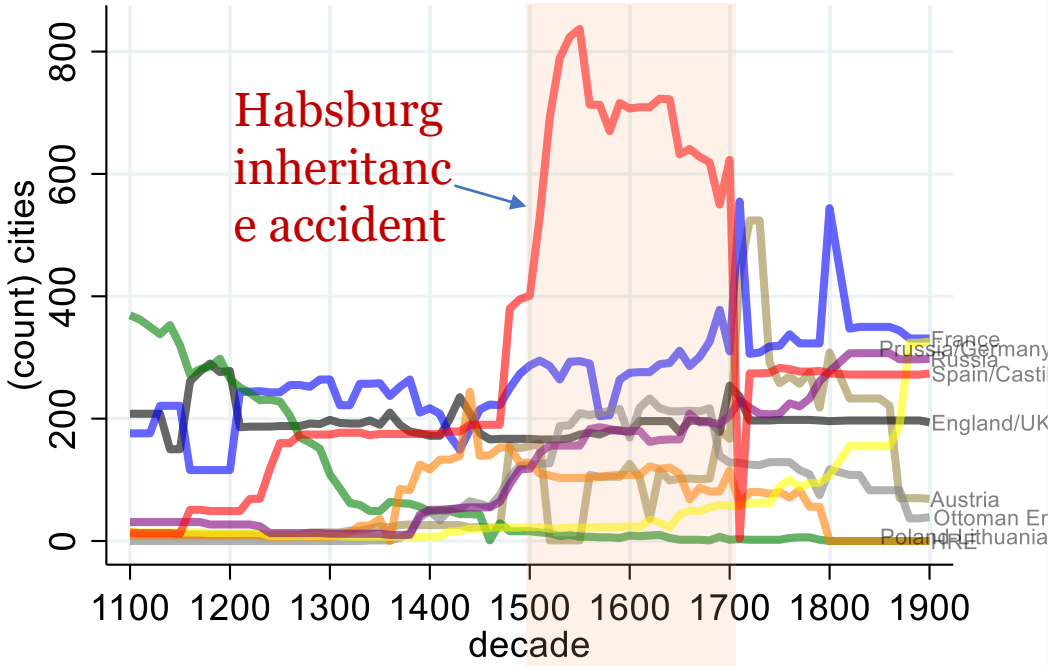
Robustness

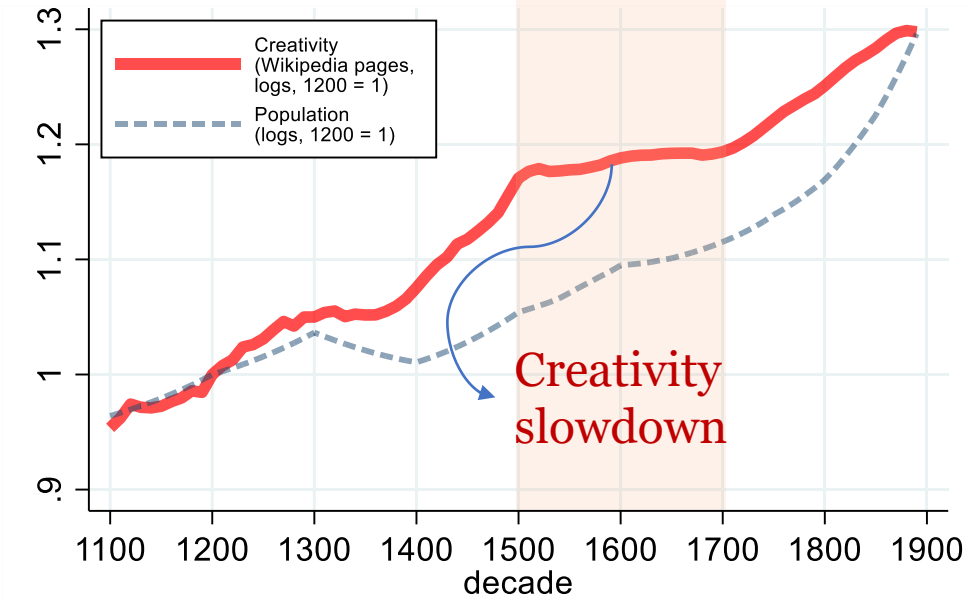
The big shock to Europe‘s political fragmentation



The big shock to Europe‘s political fragmentation





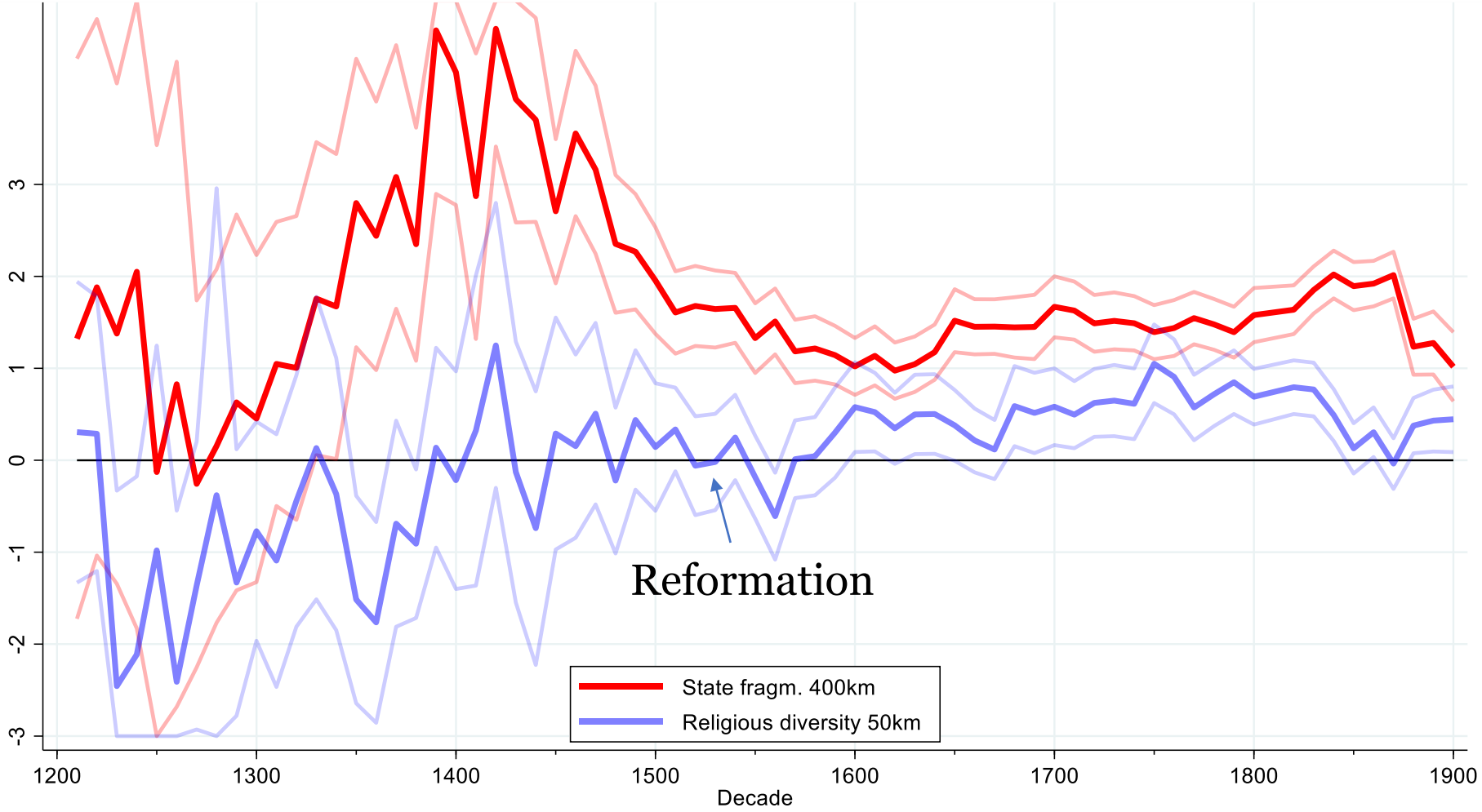


Natural experiment:

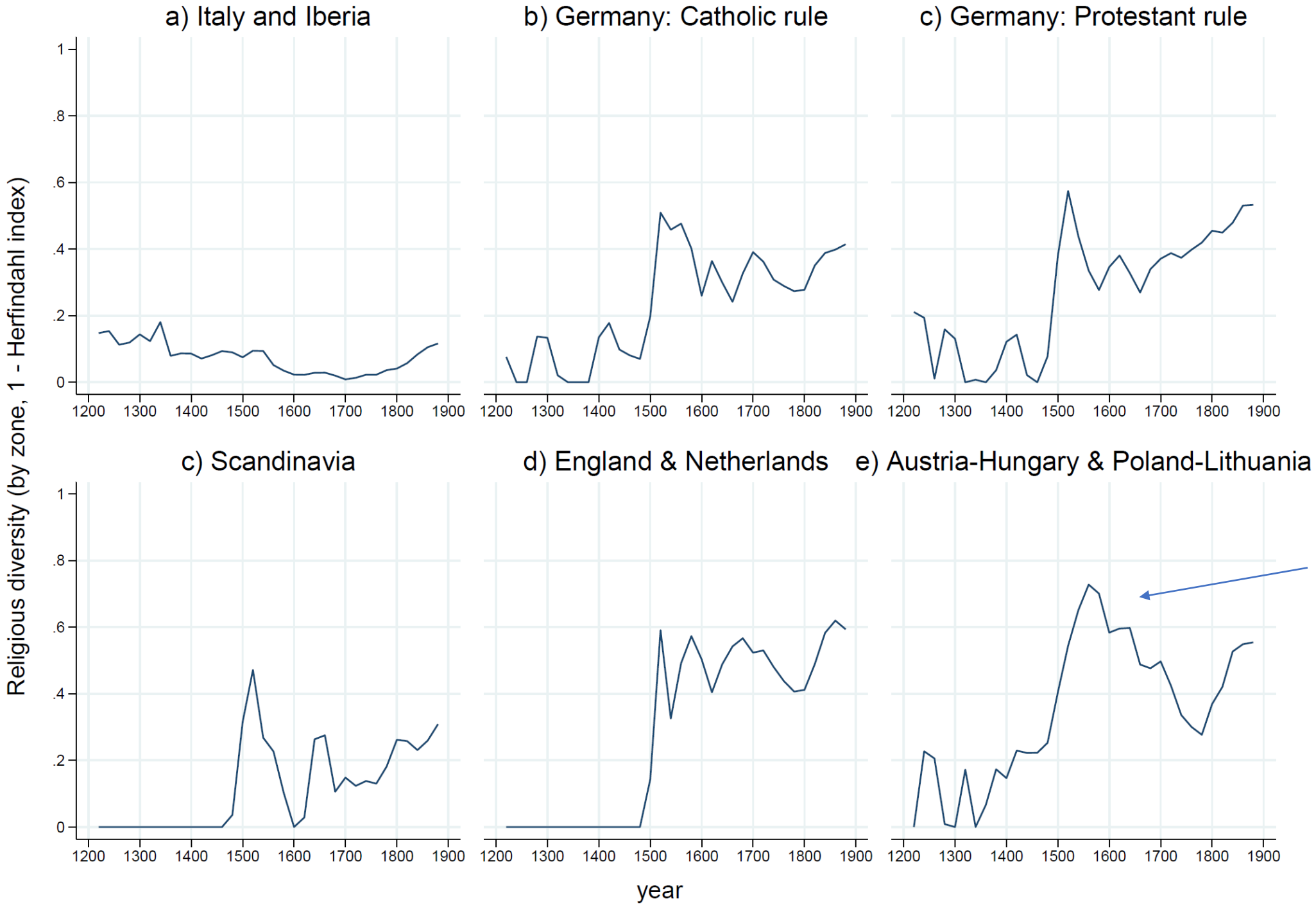
- Habsburg "accident of inheritance" (MacKenney, 1993, p. 219)
- "No one foresaw that Charles would rule the greatest empire seen in a millennium" (Parker, 2021, p. 4)
- Creativity slowdown
  - Why? Religious conflicts (see Cabello 2024a, Cabello 2024b)

Appendix figures and tables

What determined creativity, political or religious fragmentation?



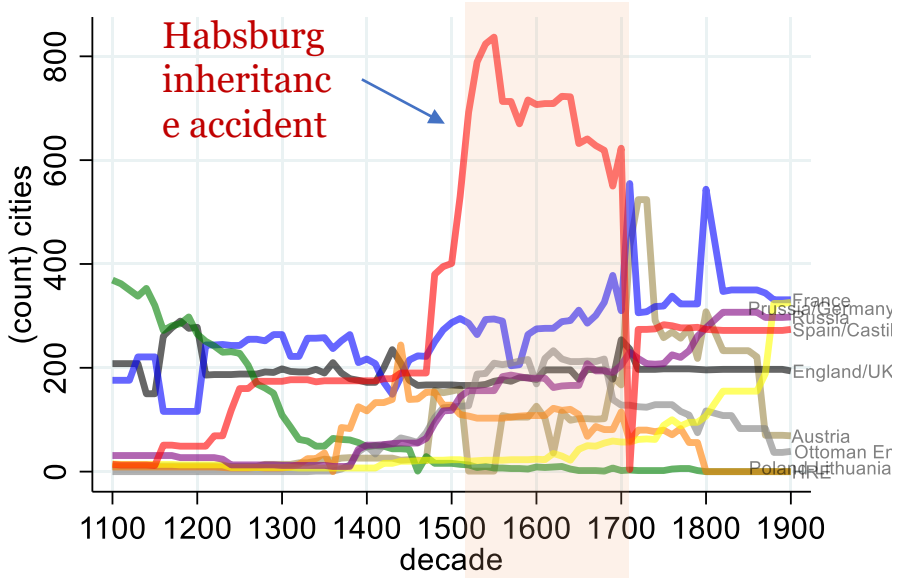
Dep. var.: Creatives' biographies p.c.. **Controls**: cities within 400km, pop. within 400km, log population.

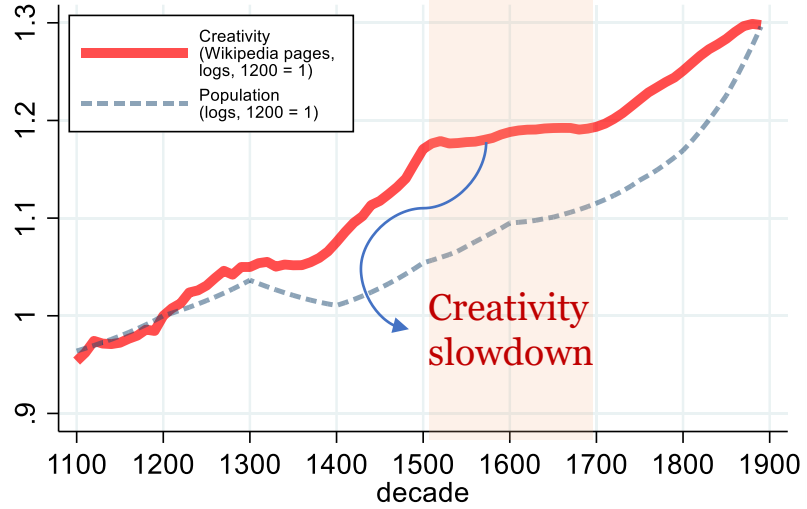


Highly religiously fragmented, yet not particularly creative

Takeaways

- Cities in **more politically-fragmentated zones** exhibited
  - higher future **religious diversity**,
  - higher future density of **educ. institutions**,
  - **more creative growth** in times of religious peace (benign competition),
  - **less creative decline** in times of religious and geopolitical conflict (ineffective persecution)
- Persistent "effects" even after political unification. Why?
  - Universities endured
  - Religious fragmentation endured
  - Political unity + religious fragmentation = tolerant laws. (Work in progress)





Thank you!

Matías Cabello

Martin Luther University Halle-Wittenberg

matias.cabello@wiwi.uni-halle.de

https://sites.google.com/view/mcabello

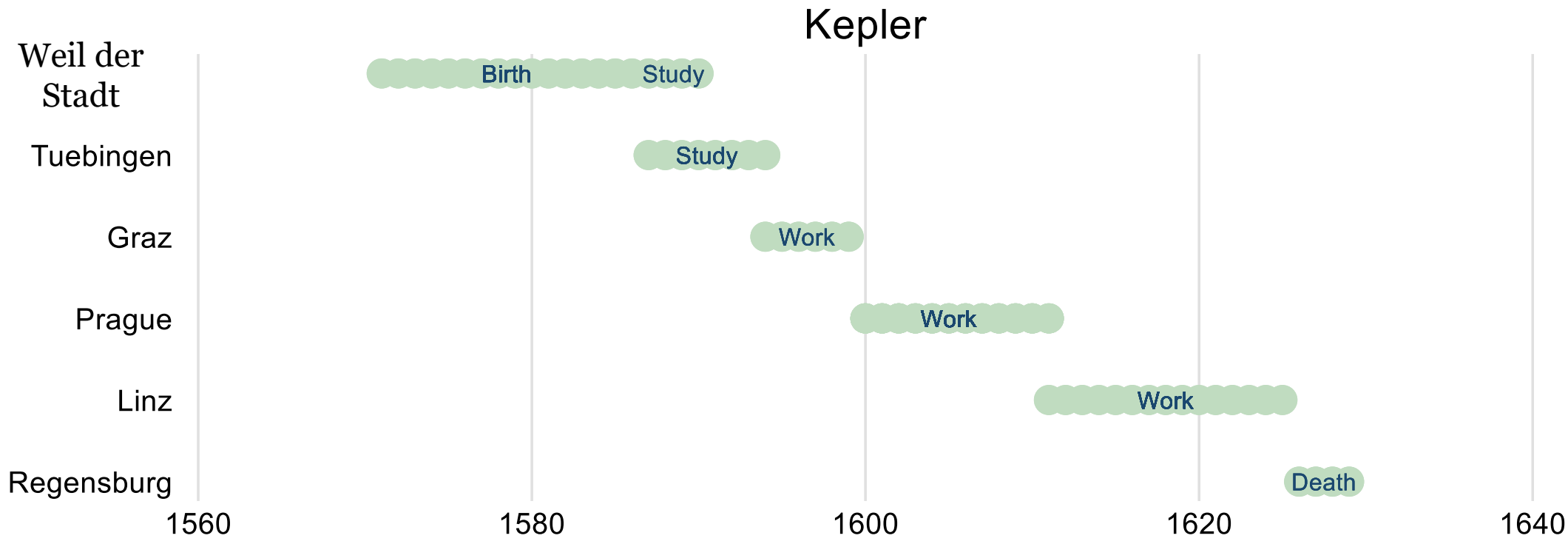
Data Appendix

Data on **creativity**

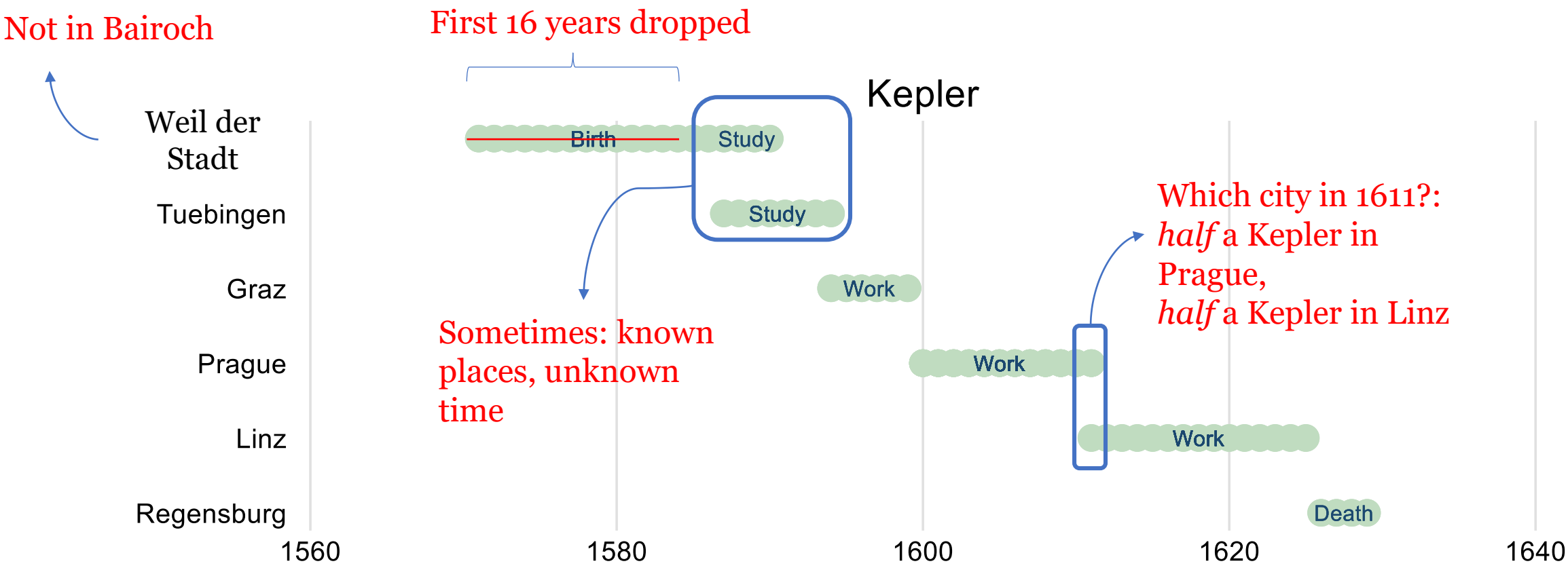
- Per capita creative individuals and their fame.
  - *Intellectuals* (incl. *scientists*) and *artists*.
  - **Sources**: Wikipedia (Wasmer et al), RETE (de la Croix et al), Wikidata, Bairoch, Burigh.
  - **Fame**: Length of all Wikipedia pages
    - *perfall* variable transformed to Wikipedia pages-length through linear projection
    - if no pages-length or perfall available, then assume smallest observed length

- Person assigned to which city?
  - Ages 16-30 in birth city
  - Places of study or work (if available)
  - Remaining time in death city

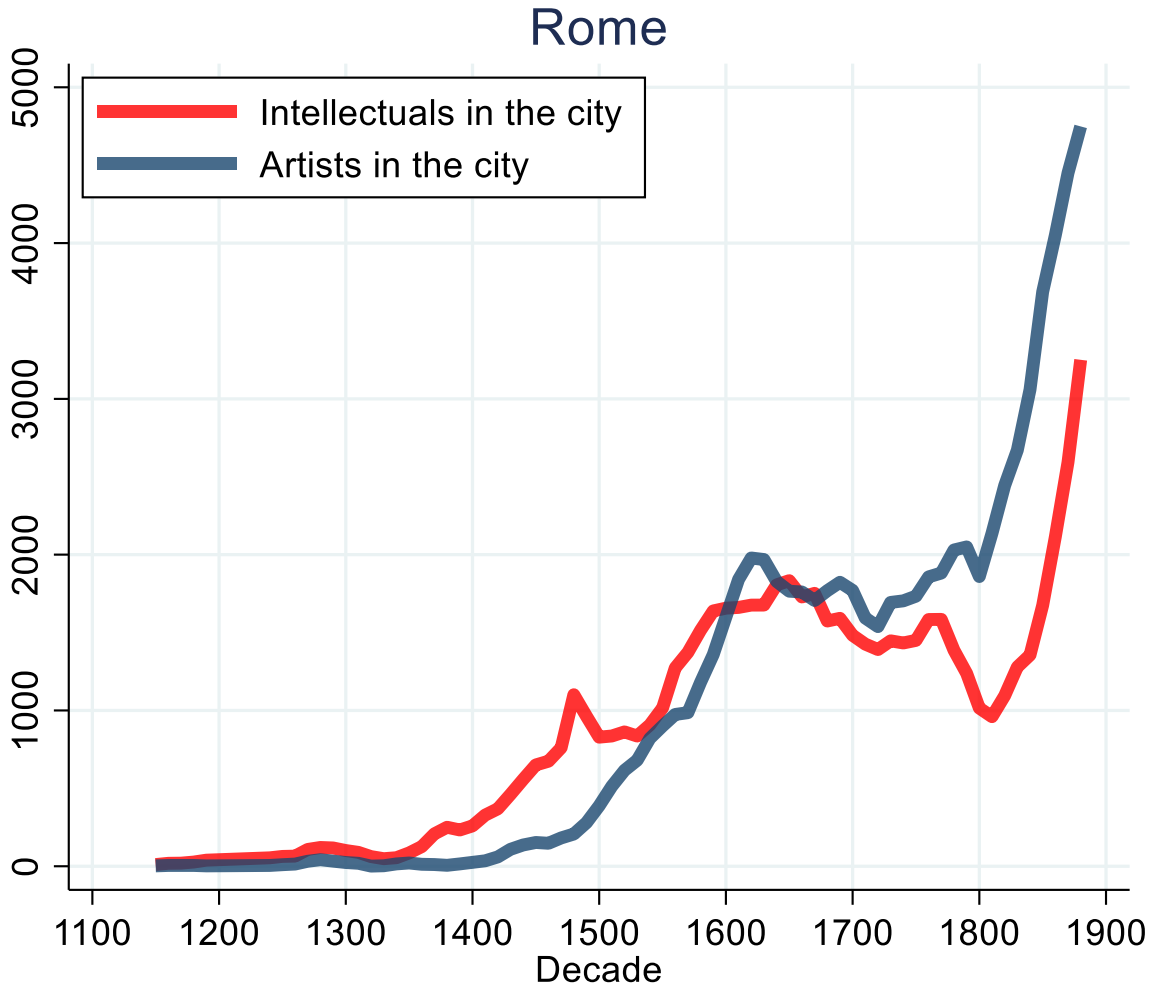
Some issues

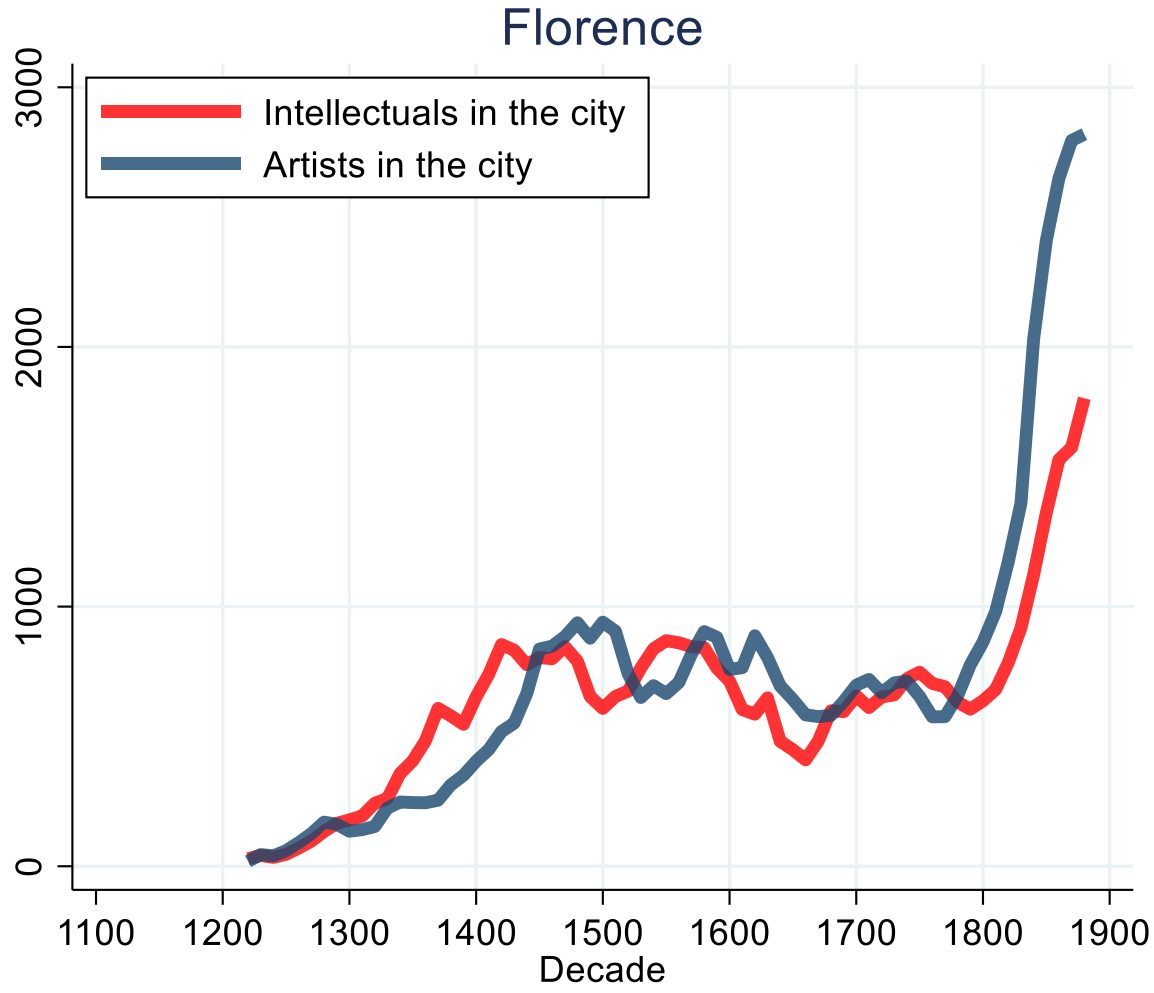

Kepler
Weil der Stadt
Tuebingen
Graz
Prague
Linz
Regensburg
Birth
Study
Study
Work
Work
Work
Death
1560
1580
1600
1620
1640

Some issues

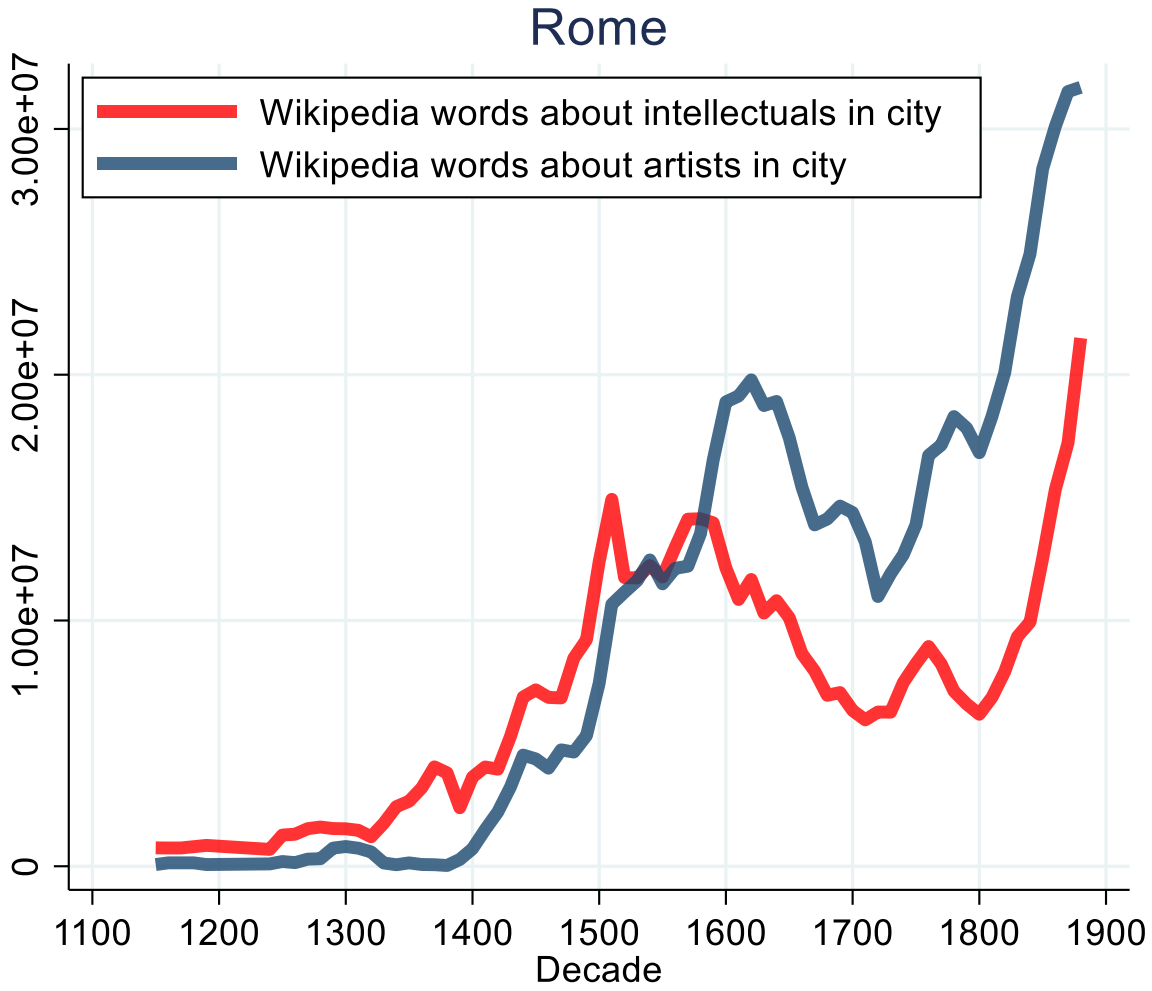

Not in Bairoch
First 16 years dropped
Kepler
Weil der Stadt
Tuebingen
Graz
Prague
Linz
Regensburg
Birth
Study
Study
Work
Work
Work
Death
Sometimes: known places, unknown time
Which city in 1611?:
half a Kepler in Prague,
half a Kepler in Linz
1560
1580
1600
1620
1640

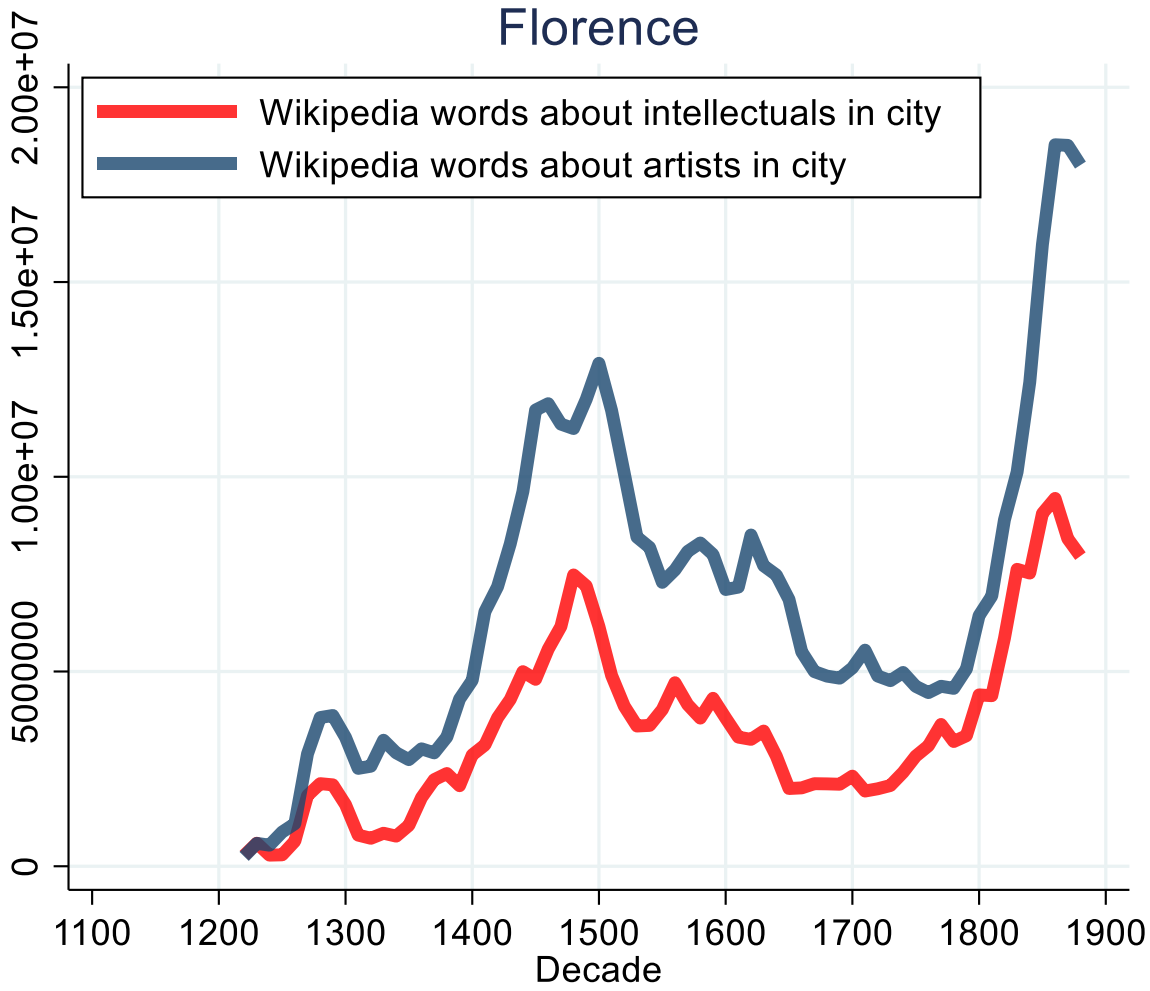
Result: intellectuals and artists (count)





Result: intellectuals and artists (weighted*)





* Fame = sum of words of Wikipedia pages in all languages

Fragmentation data: **Political**

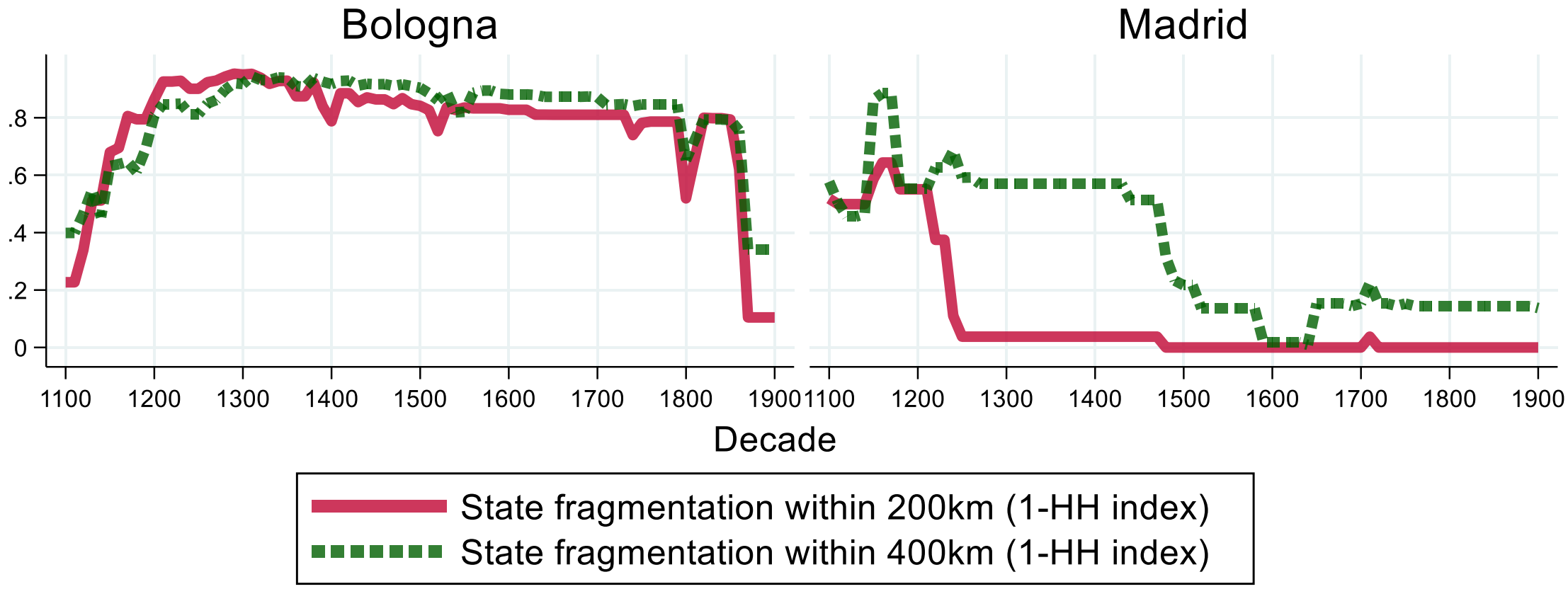
Sources

- Abrahmson
  - Every 5 years between 1100 and 1790 but needs cleaning (and Medieval borders were fuzzy anyway)
- 19th cent.: Max Planck Institute for Demographic Research (MPIDR)
- Nüssli vector data

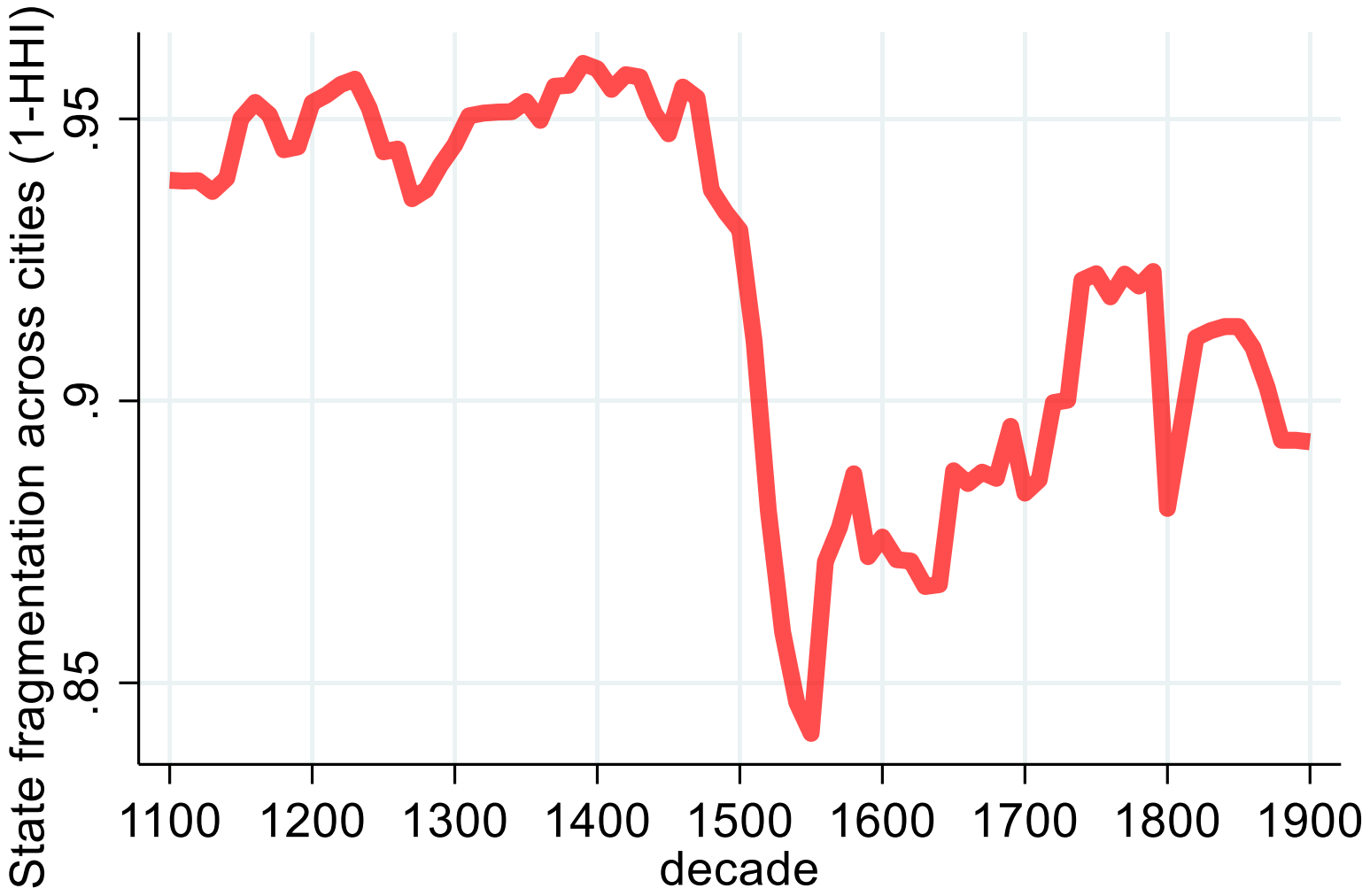
Output: city-decade panel

- State concentration within 100, 200, … , 500 km.
- 1 – Herfindahl-Hirschman index

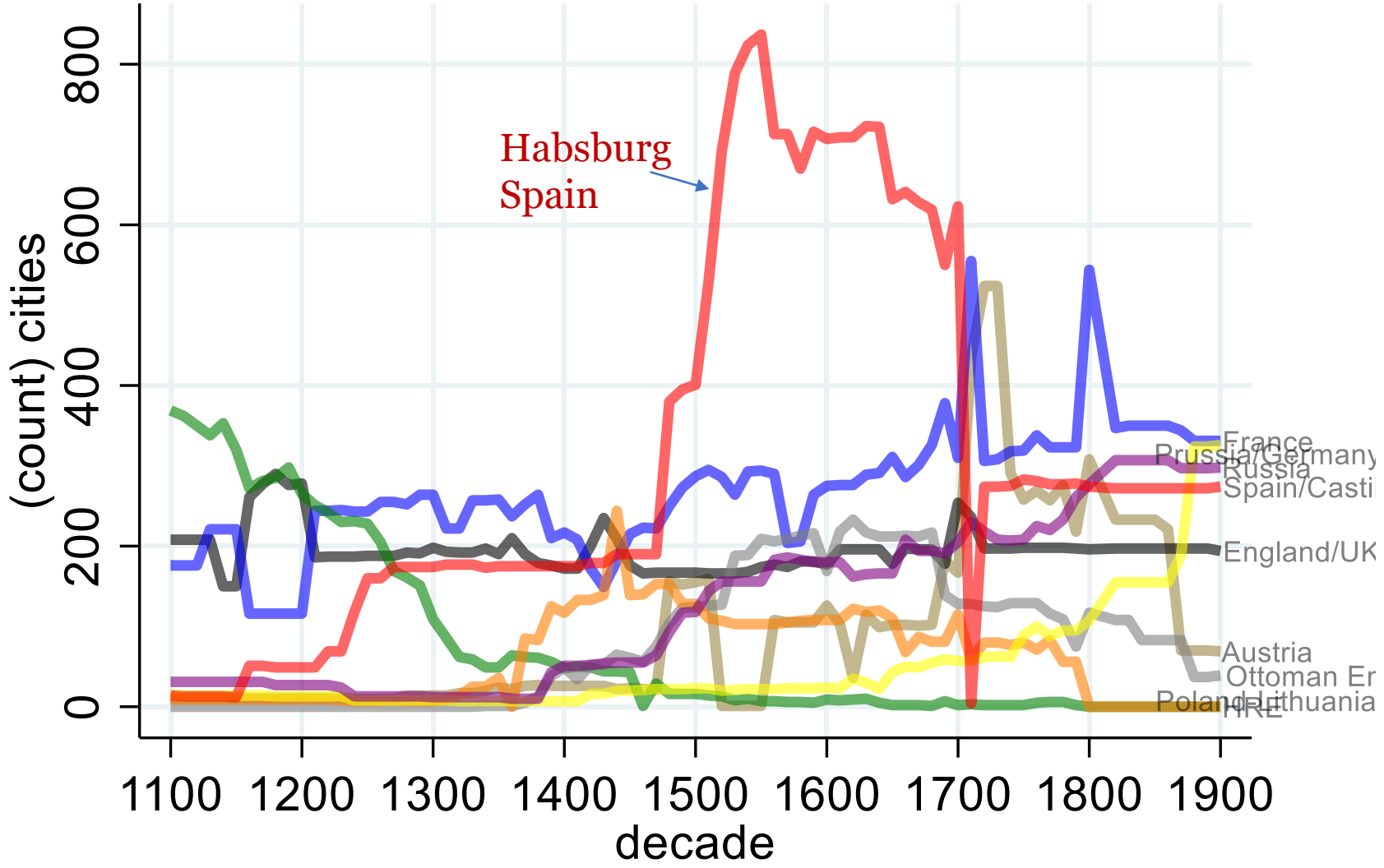
Fragmentation data: **Political**



Fragmentation data: **Political**



Fragmentation data: **Political**

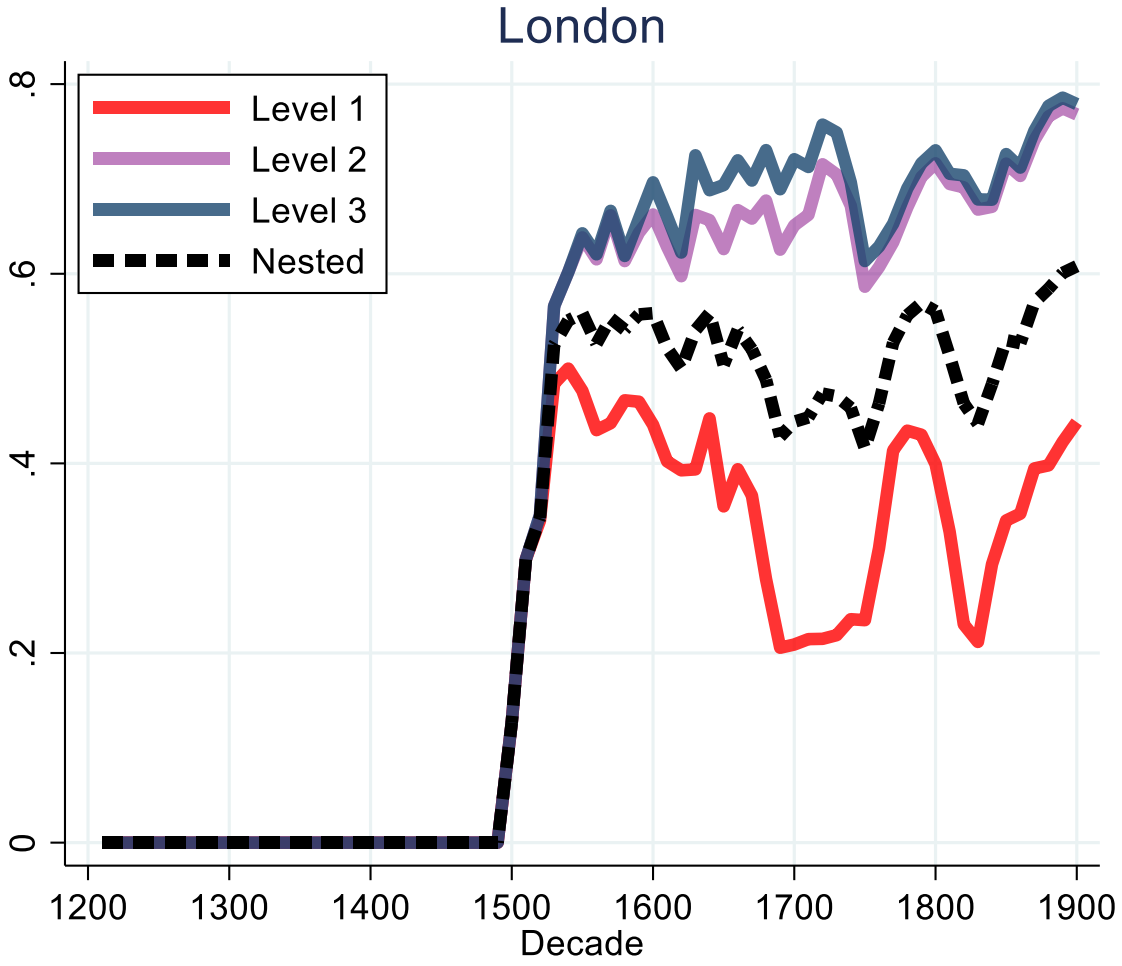


Fragmentation data: **Religious**

- At the city level
  - Within city or within 50, …, 200 km.
  - 1 – Herfindahl-Hirschman index
- Wikidata: religion by person

  Person‘s relig. assigned to city
    - Ages 20-30 in birth city
    - Places of study or work (if available)
    - Remaining time in death city

Fragmentation data: **Religious**

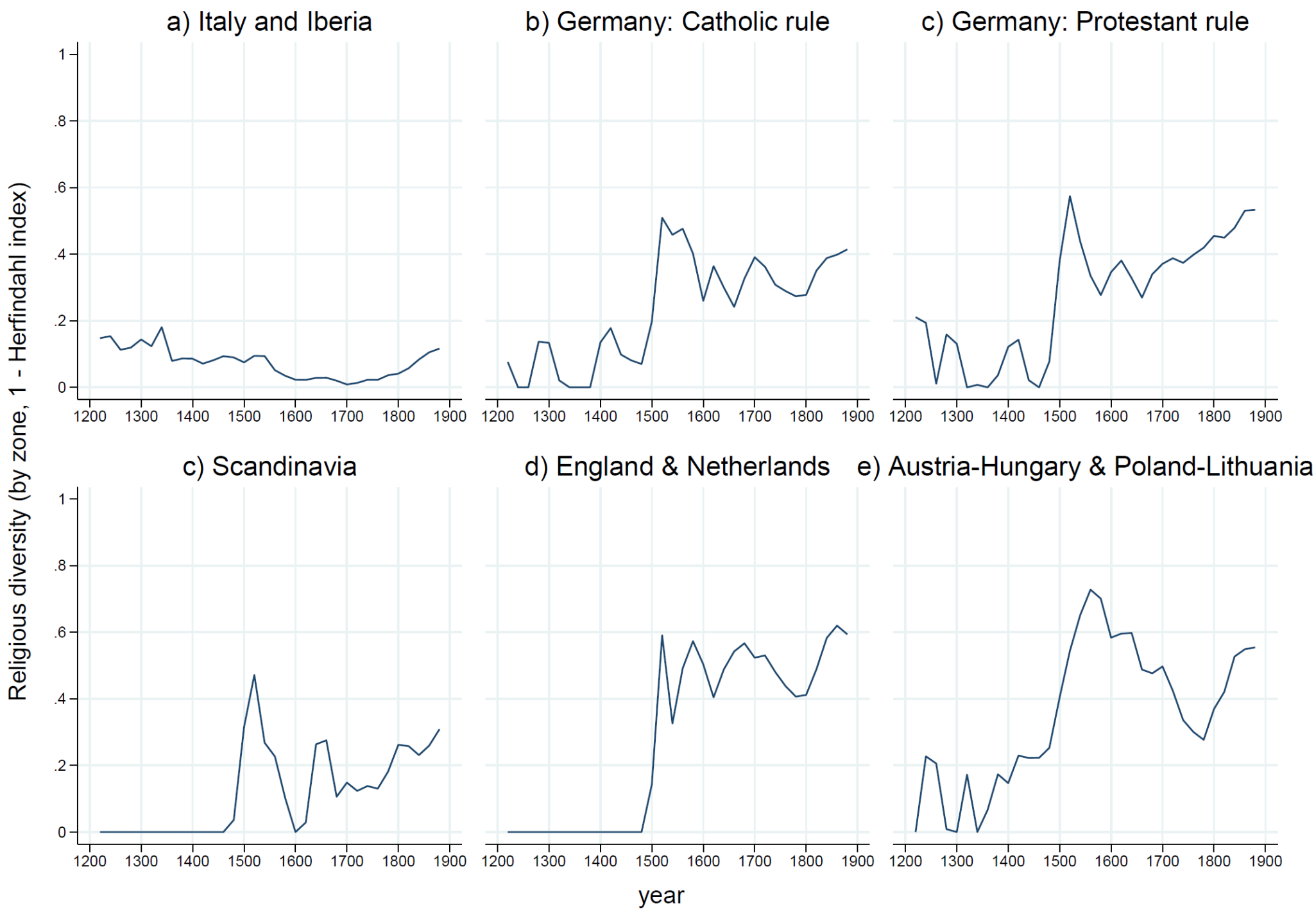


Levels of diversity*

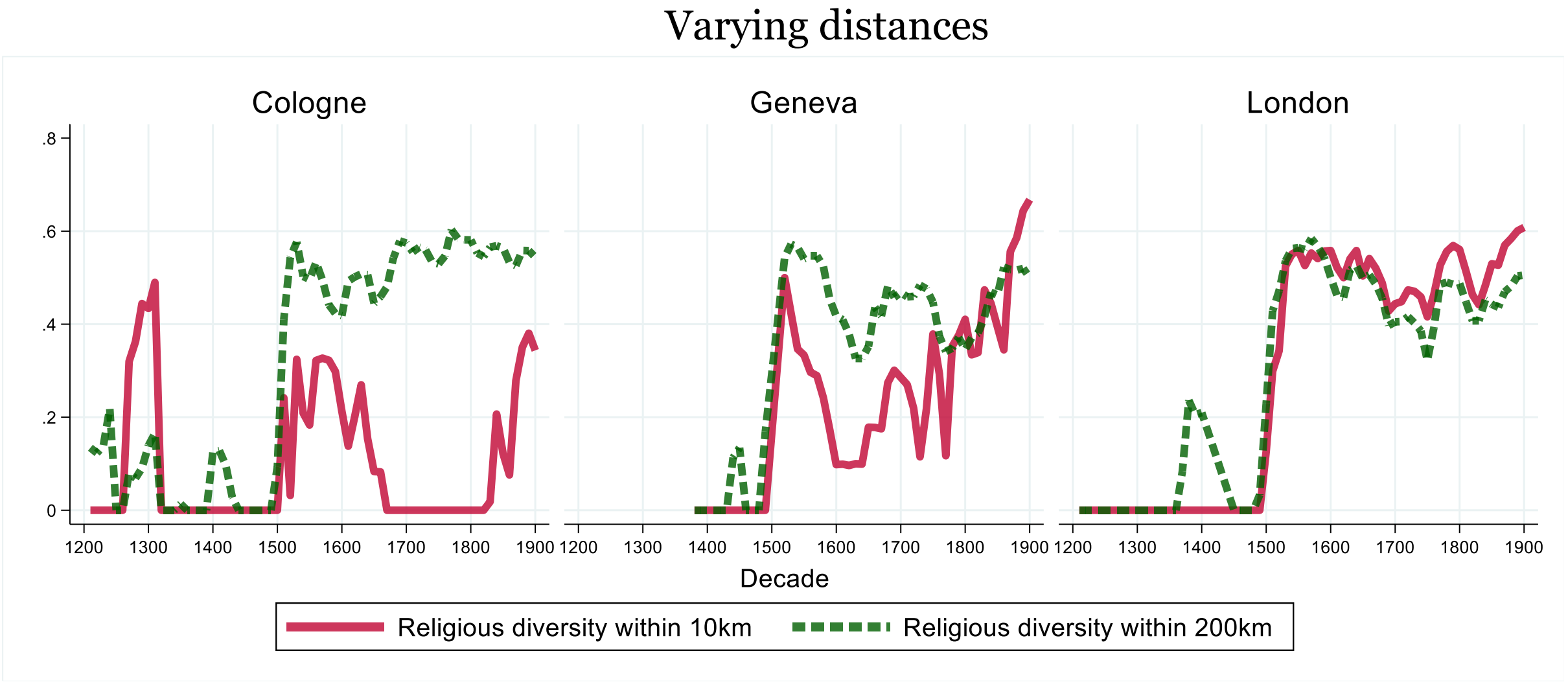
1. Distinguishes *Roman Catholics, Other Christians, Jews, Muslims*.
2. Subdivided in *Lutherans, Calvinists, Anglicans, Eastern Orthodox, Anabaptists, … Cathars, Hussites*, etc.
3. Subdivided in Presbyterians, Methodists, Arminians, Quakers, … , *Old Catholics, Ruthenian Uniate Church*, etc.

Nested = 0.5*Level1+ 0.3*Level2 + 0.2*Level3

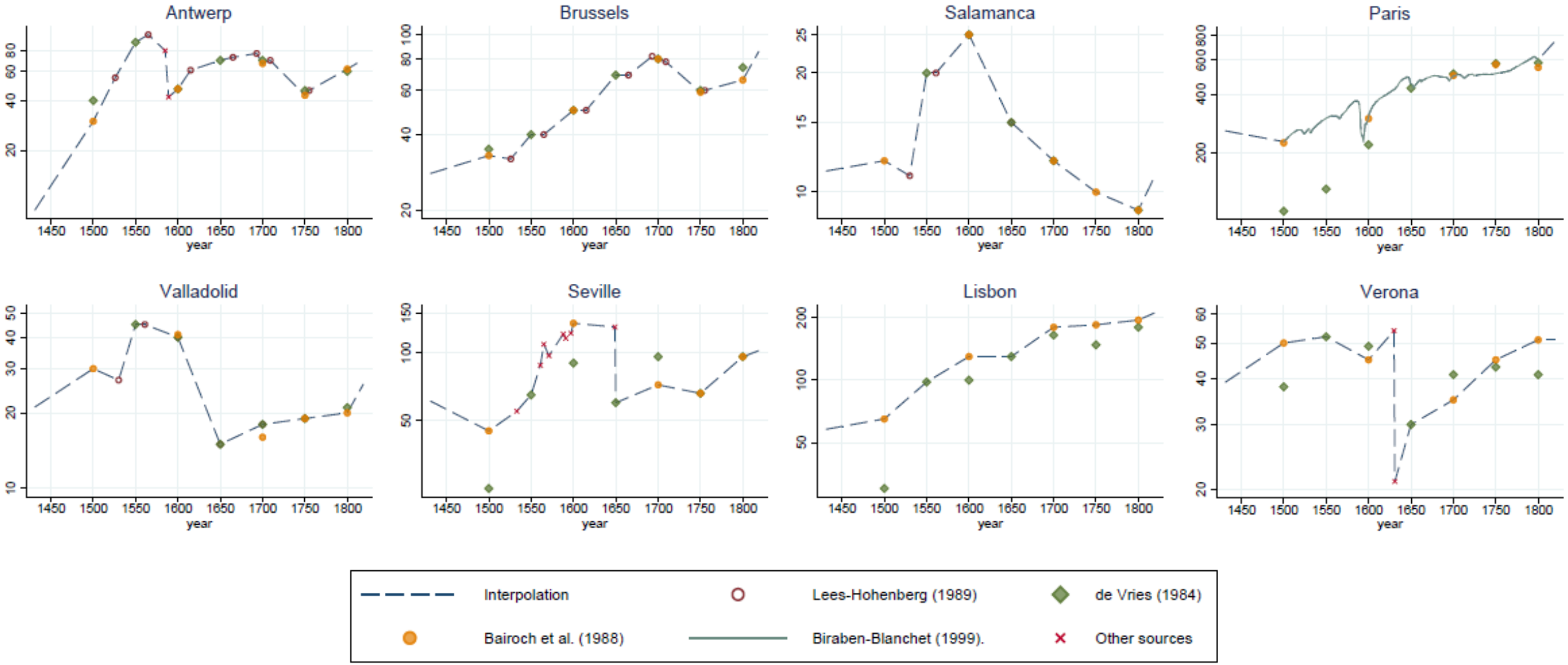
* Main source: Hillerbrand, H. *Encyclopedia of Protestantism*, 2004.


a) Italy and Iberia
b) Germany: Catholic rule
c) Germany: Protestant rule
c) Scandinavia
d) England & Netherlands
e) Austria-Hungary & Poland-Lithuania
Religious diversity (by zone, 1 - Herfindahl index)
0
.2
.4
.6
.8
1
1200
1300
1400
1500
1600
1700
1800
1900
year

Fragmentation data: **Religious**



Population estimates



Fragmentation may *spur* creativity

Peaceful competition channel

"In Catholic France … competition among different religious movements led to competition in the educational sphere, such as the competition between Jesuit and Jansenist schools …

Religious competition was also an important factor in Britain, where the Church of England had to contend with dissenters, who founded the 'dissenting academies' …

… peaceful competition among religions, much like peaceful competition between states, encouraged intellectual innovation and progress."

Mokyr, 2017, *A Culture of Growth*

Fragmentation may *spur* creativity

Peaceful competition channel

…because Europe was fragmented, Columbus succeeded on his **fifth try** in persuading one of Europe's hundreds of princes to sponsor.

The story was the same with Europe's cannon, electric lighting, printing, small firearms, and innumerable other innovations: … first neglected or opposed in some parts of Europe … but once adopted in one area, [they] spread to the rest of Europe.

Diamond, 2007, *Guns, Germs and Steel*

Fragmentation may *spur* creativity

Peaceful competition channel

… These consequences of Europe's **disunity** stand in sharp contrast to those of China's **unity**. … [which] decided to halt other activities besides overseas navigation: it abandoned development of an elaborate water-driven spinning machine, stepped back from the verge of an industrial revolution in the 14th century, demolished or virtually abolished mechanical clocks after leading the world in clock construction, and retreated from mechanical devices and technology in general after the late 15th century.

Diamond, 2007, *Guns, Germs and Steel*

Prop. 2: *Fragmentation → Universities*

Why?

Demand for bureaucrats

Go back

- "In the thirteenth century kings and princes became more anxious to have the services of university-trained administrators" (Nardi, 1991, p. 93).
- "the rise of bureaucratic institutions in Spain in the years between 1500 and 1700, and the changes in Spanish society that this occasioned, were the most important and far reaching influences upon Spanish educational history during that period" (Kagan, 1974).

Prop. 2: *Fragmentation → Universities*

Why?

Papal Schism (1378-1417)

Go back

- "Evidently the rival popes realized that they needed the intellectual support of part of the academic world. They therefore encouraged the foundation of universities in areas on whose fidelity they could count" (Nardi, 1991, pp. 101–2).
- "The tendency to multiply Universities in Germany gained further strength from the Schism, since the Roman Popes were always ready to grant the necessary bulls as a means of weakening Paris, the great champion of the Avignon Pontiffs. (Rashdall, 1895b, p. 247)

Prop. 2: *Fragmentation → Universities*

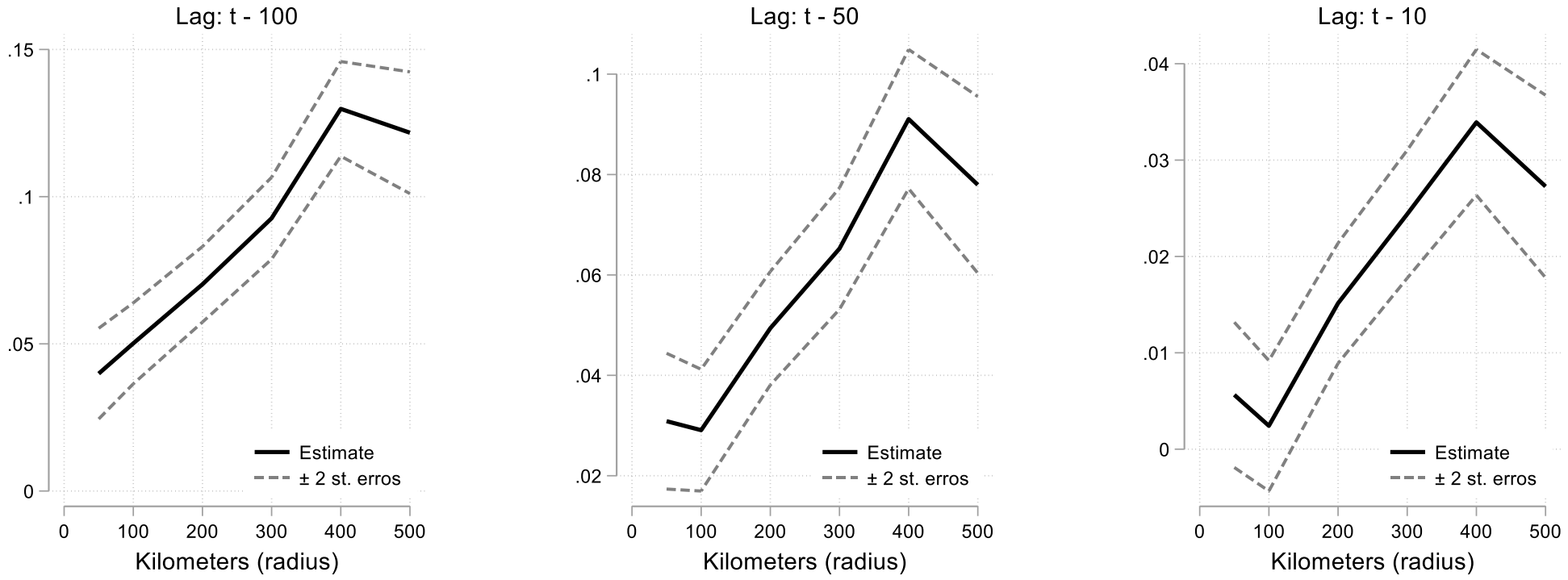
Why? Intra-state monopolies

Go back

- "the University of **Paris**, believing that the towns of Caen and Bourges were too close, sought to check the creation of new universities there."
- "In the kingdom of Aragon, the University of **Lerida** never ceased reminding the world at large of the monopoly granted it in 1300 by its founder, King Diego II, in order to impede plans for the founding of universities in other cities, in Barcelona in particular."
- "Likewise, in Italy, **Pavia** managed to establish its right to remain the one and only university within the duchy of Milan, and thus to restrict the claims of existing or projected schools in Piacenza, Parma, and Milan itself." (Verger, 1991, p. 58)

Distance and lag robustness

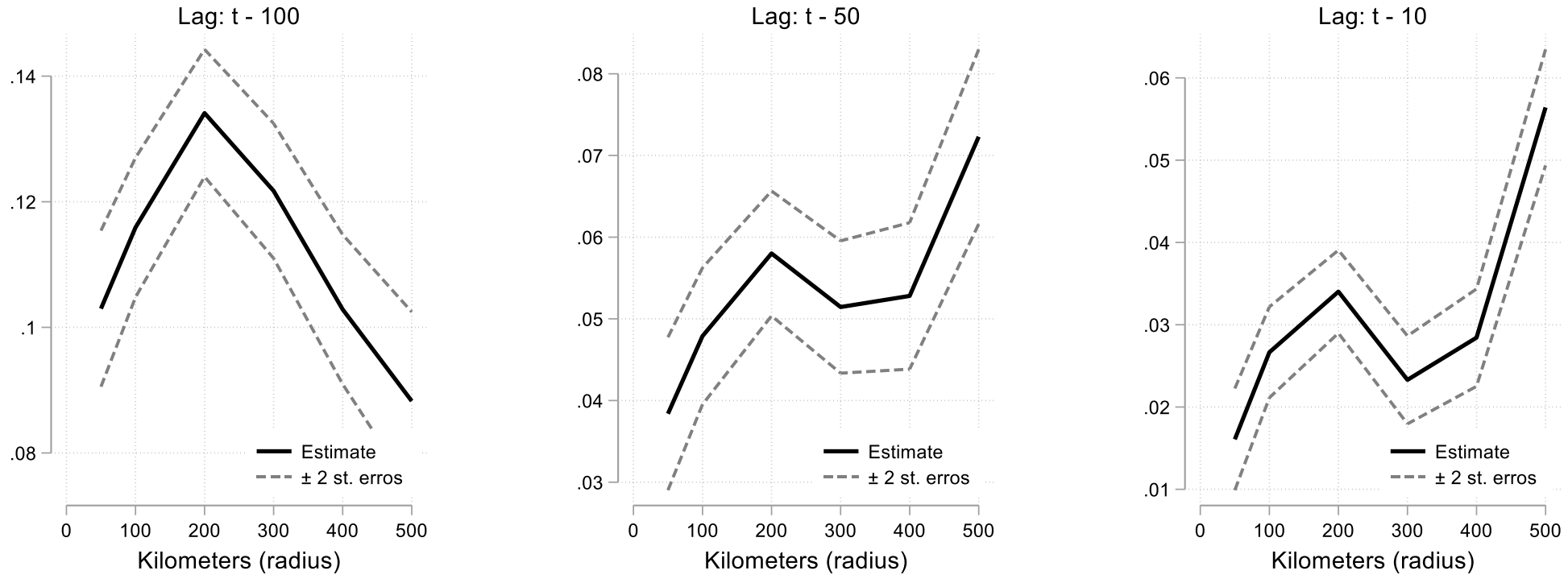
Go back



Estimates of coefficient β in $y_{it} = \beta \cdot StateFrag(r)_{it} + \alpha y_{i,t-1} + X_{it}\gamma + \varepsilon$, where
y_t is religious diversity within 50km.
X_t contains log city population, latitude & longitude with interaction, languages FE, country FE, year FE, the no. of cities within radius r, log total urban population within radius r.

Distance and lag robustness

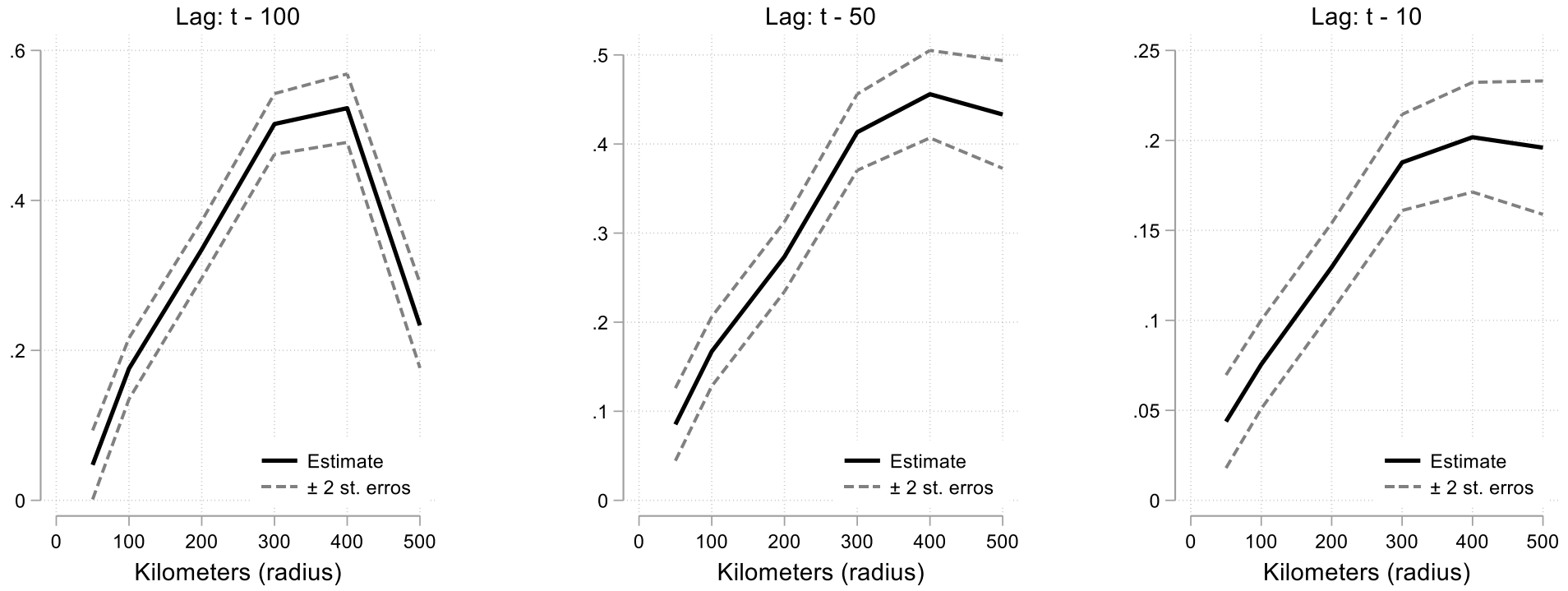
Go back



Estimates of coefficient β in $y_{it} = \beta \cdot StateFrag(r)_{it} + \alpha y_{i,t-1} + X_{it}\gamma + \varepsilon$, where
y_t is the number of universities within 50km.
X_t contains log city population, latitude & longitude with interaction, languages FE, country FE, year FE, the no. of cities within radius r, log total urban population within radius r.

Distance and lag robustness

Go back



Estimates of coefficient β in $y_{it} = \beta \cdot StateFrag(r)_{it} + \alpha y_{i,t-1} + X_{it}\gamma + \varepsilon$, where
y_t is log(creative individuals / population)
X_t contains log city population, latitude & longitude with interaction, languages FE, country FE, year FE, the no. of cities within radius r, log total urban population within radius r

Prop. 3: *Fragmentation → Creativity*

Go back

Dependent variable: Creatives' Wikip. visibility p.c.				
	Period			
	1100–1550	1560–1690	1700–1790	1800–1900
State fragmentation (400km)	$1.74^{\bullet}$	0.50^{***}	$0.67^{\bullet}$	$0.76^{\bullet}$
Dep. variable in $t-100$	✓	✓	✓	✓
Full controls	✓	✓	✓	✓
Observations	7547	10635	9891	12716
R-squared	0.23	0.25	0.41	0.48

Notes: Population-weighted, city-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population of the city, the number of cities and their population within 400 km, and fixed effects for time, languages, and countries. Sources described in the main text. * $p<0.10$, ** $p<0.05$, *** $p<0.01$, $^{\bullet}$ $p<0.00000001$

Prop. 3: *Fragmentation → Creativity*

Go back

Dependent variable: Creatives' Wikip. visibility p.c.

	Period				
	1100–1550	1560–1690	1700–1790	1800–1900	
State fragmentation (400km)	1.63$^{\bullet}$	0.53***	0.72$^{\bullet}$	0.78$^{\bullet}$	System ✓
State fragmentation (100km)	-0.08	-0.37***	-0.09	0.11**	Local *x*
Dep. variable in $t-100$	✓	✓	✓	✓	
Full controls	✓	✓	✓	✓	
Observations	8150	11369	10564	13549	
R-squared	0.22	0.25	0.41	0.47	

Notes: Population-weighted, city-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, $^{\bullet}$ $p < 0.00000001$

Prop. 3: *Fragmentation → Creativity*

Go back

Dependent variable: Creatives' biographies p.c.

	Period				
	1100–1550	1560–1690	1700–1790	1800–1900	
State fragmentation (400km)	0.82$^{\bullet}$	0.42$^{\bullet}$	0.61$^{\bullet}$	0.59$^{\bullet}$	System ✓
State fragmentation (100km)	-0.01	-0.13**	0.15***	0.01	Local *x*
Dep. variable in $t-100$	✓	✓	✓	✓	
Full controls	✓	✓	✓	✓	
Observations	8146	11363	10564	13549	
R-squared	0.41	0.34	0.50	0.56	

Notes: Population-weighted, city-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, $^{\bullet}$ $p < 0.00000001$

Excluding Italy

Go back

Dependent variable: Creatives' biographies p.c.

	Period			
	1100–1550	1560–1690	1700–1790	1800–1900
State fragmentation (400km)	0.50***	0.41***	0.37***	0.65•
State fragmentation (100km)	-0.29***	-0.27***	0.02	-0.07
Dep. variable in $t-100$	✓	✓	✓	✓
Full controls	✓	✓	✓	✓
Observations	5822	9321	8897	11566
R-squared	0.44	0.34	0.50	0.57

System ✓

Local *x*

Notes: Population-weighted, city-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, • $p < 0.00000001$

Table 12: Fragmentation and impact of creatives

Dependent variable: Creatives' Wikip. visibility p.c. (logs)	Period			
	1100–1550	1560–1690	1700–1790	1800–1900
State fragmentation				
- within 400km	1.14***	0.39***	0.33***	0.70•
- within 100km	0.16	-0.01	-0.21***	-0.05
Religious fragmentation				
- within 50km	-0.35***	-0.03	0.03	0.36•
- within 200km	0.43**	-0.10	0.18	-0.45***
Universities				
- within 50km	0.41•	0.26•	0.23•	0.20•
- within 400km	-0.02***	-0.01***	-0.01***	-0.00**
Controls				
Dep. var. in $t-100$	0.26•	0.34•	0.38•	0.45•
Catholic rule in 1600	0.14	-0.55•	-0.11**	0.25•
Full controls	✓	✓	✓	✓
Observations	3692	6603	5992	7514
R-squared	0.42	0.44	0.57	0.64

Notes: City-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, • $p < 0.00000001$

Go back

Table 14: Fragmentation and impact of scientists

Dependent variable: Scientists' Wikip. visibility p.c. (logs)	Period			
	1100–1550	1560–1690	1700–1790	1800–1900
State fragmentation				
- within 400km	0.48	0.87$^{\bullet}$	0.16	0.61$^{\bullet}$
- within 100km	0.44**	-0.46***	-0.26***	0.08
Religious fragmentation				
- within 50km	0.17	0.03	0.20*	0.24***
- within 200km	0.84**	-0.29	0.25	-0.16
Universities				
- within 50km	0.37$^{\bullet}$	0.33$^{\bullet}$	0.32$^{\bullet}$	0.23$^{\bullet}$
- within 400km	0.01	-0.01***	-0.01$^{\bullet}$	-0.00*
Controls				
Dep. var. in $t-100$	0.28$^{\bullet}$	0.26$^{\bullet}$	0.29$^{\bullet}$	0.37$^{\bullet}$
Catholic rule in 1600	0.29	-0.53***	-0.17**	0.14***
Full controls	✓	✓	✓	✓
Observations	1501	3773	4235	6341
R-squared	0.33	0.36	0.52	0.58

Notes: City-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, $^{\bullet}$ $p < 0.00000001$

Go back

Table 18: Fragmentation and impact of artists

Dependent variable: Artists' Wikip. visibility p.c. (logs)	Period			
	1100–1550	1560–1690	1700–1790	1800–1900
State fragmentation				
- within 400km	1.78***	0.47***	0.63•	0.70•
- within 100km	0.24	0.08	-0.37***	-0.06
Religious fragmentation				
- within 50km	-0.04	-0.08	0.17*	0.52•
- within 200km	0.12	-0.28	0.15	-0.75•
Universities				
- within 50km	0.03	0.16•	0.18•	0.19•
- within 400km	-0.01	-0.00	-0.00	-0.01***
Controls				
Dep. var. in $t-100$	0.24•	0.33•	0.33•	0.44•
Catholic rule in 1600	0.17	-0.51•	-0.03	0.30•
Full controls	✓	✓	✓	✓
Observations	1362	3691	4112	6065
R-squared	0.45	0.46	0.53	0.63

Notes: City-decade OLS estimates. Full controls are latitude, longitude, latitude × longitude, log population, and fixed effects for time, languages, and countries. Sources described in the main text. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, • $p < 0.00000001$

Go back

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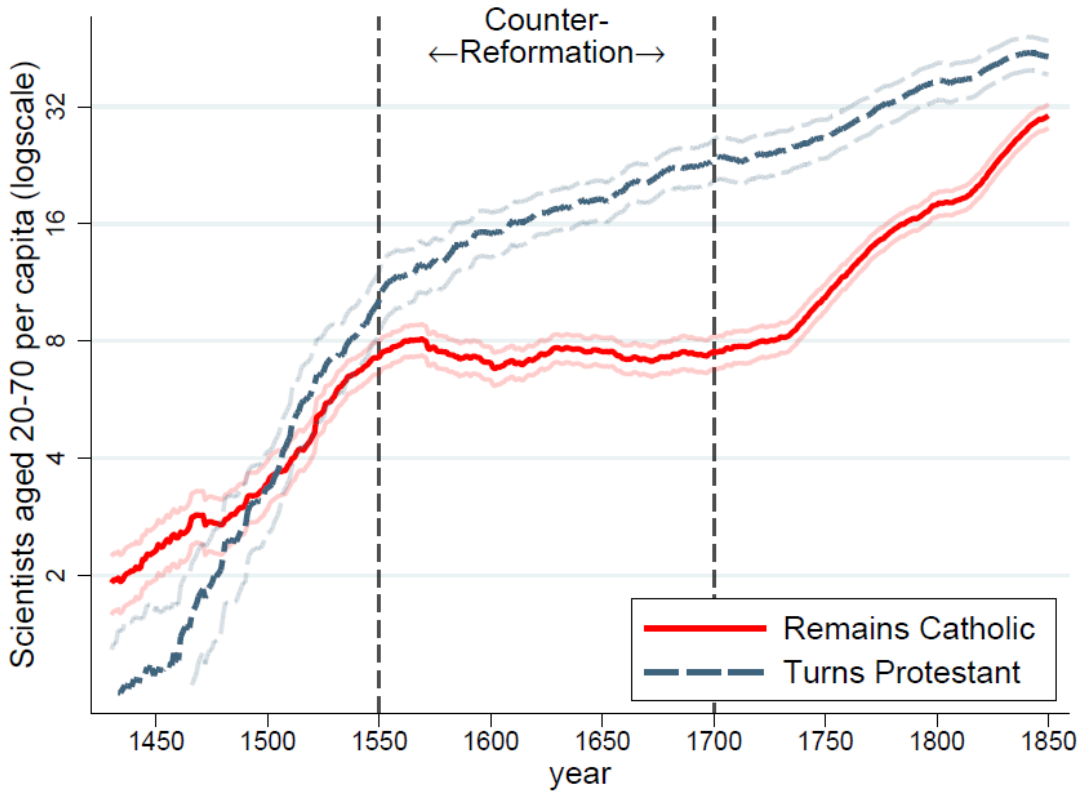
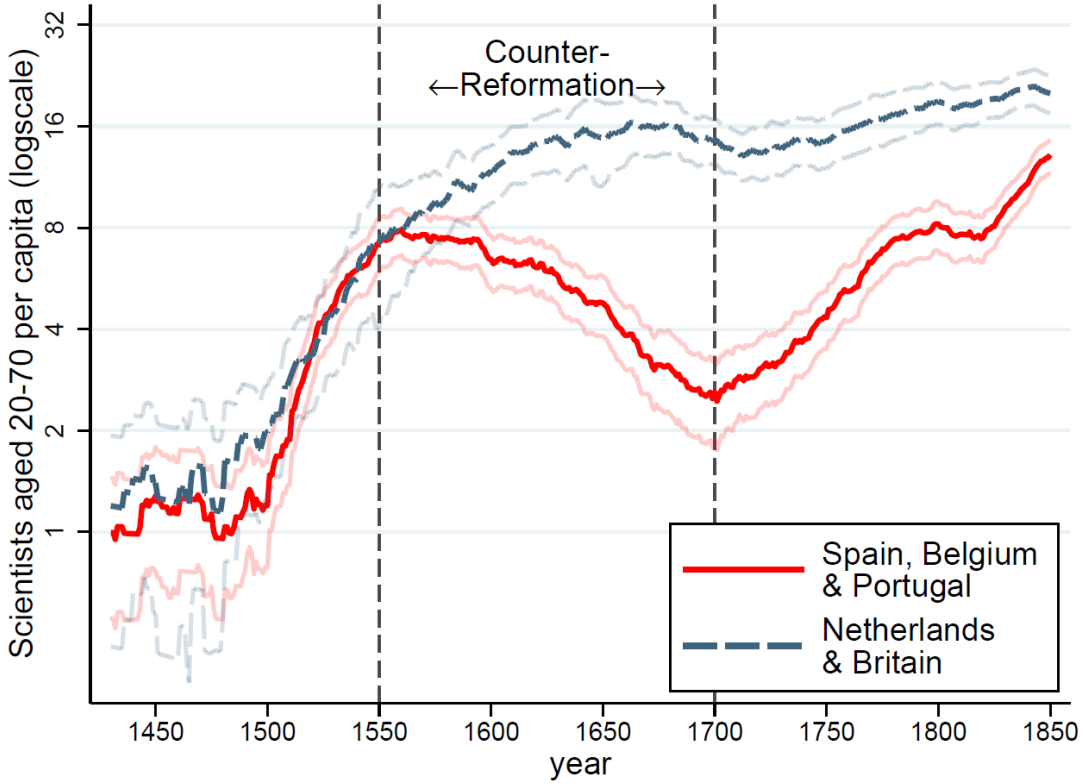
1550-1700: Catholics vs. Protestants

a) All cities



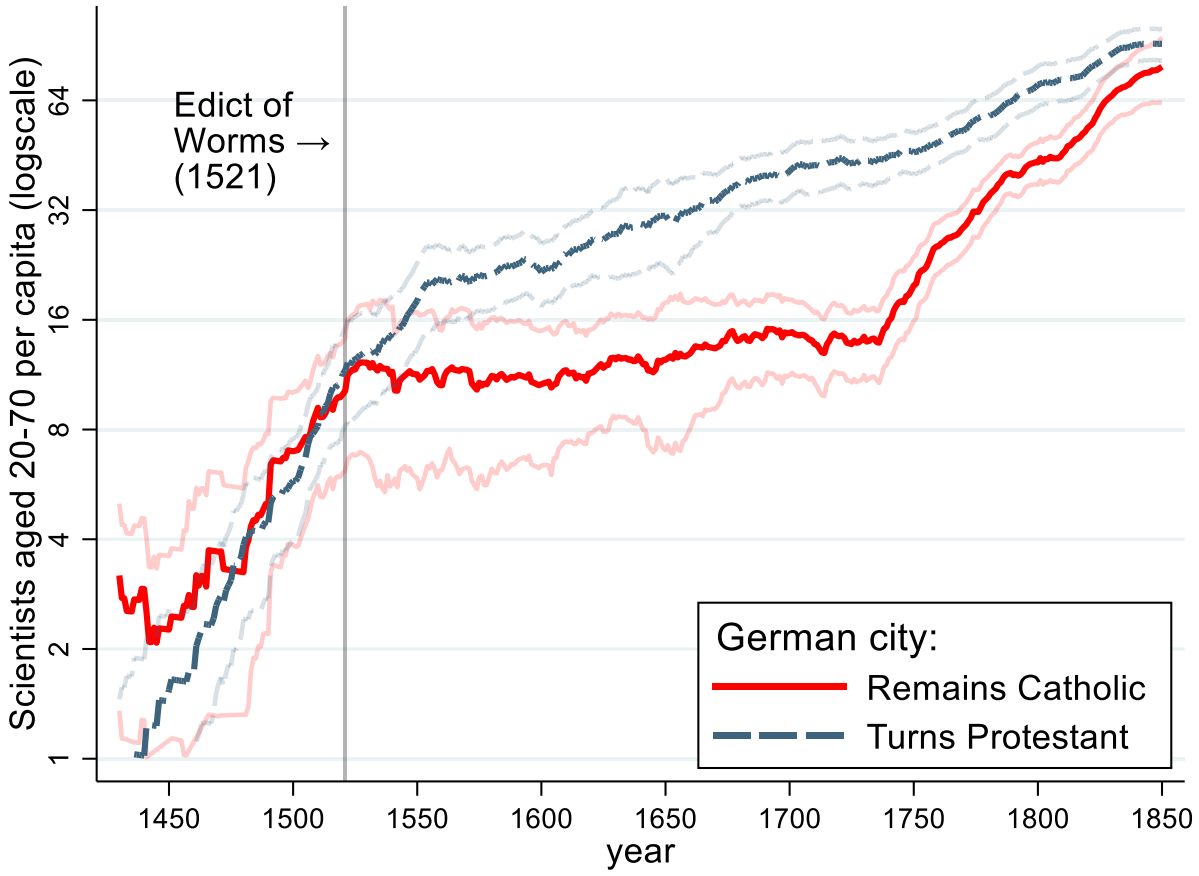
b) Atlantic countries



See also decline in quality: plot1, plot2. Source: Cabello 2023

Back

Case study: Germany

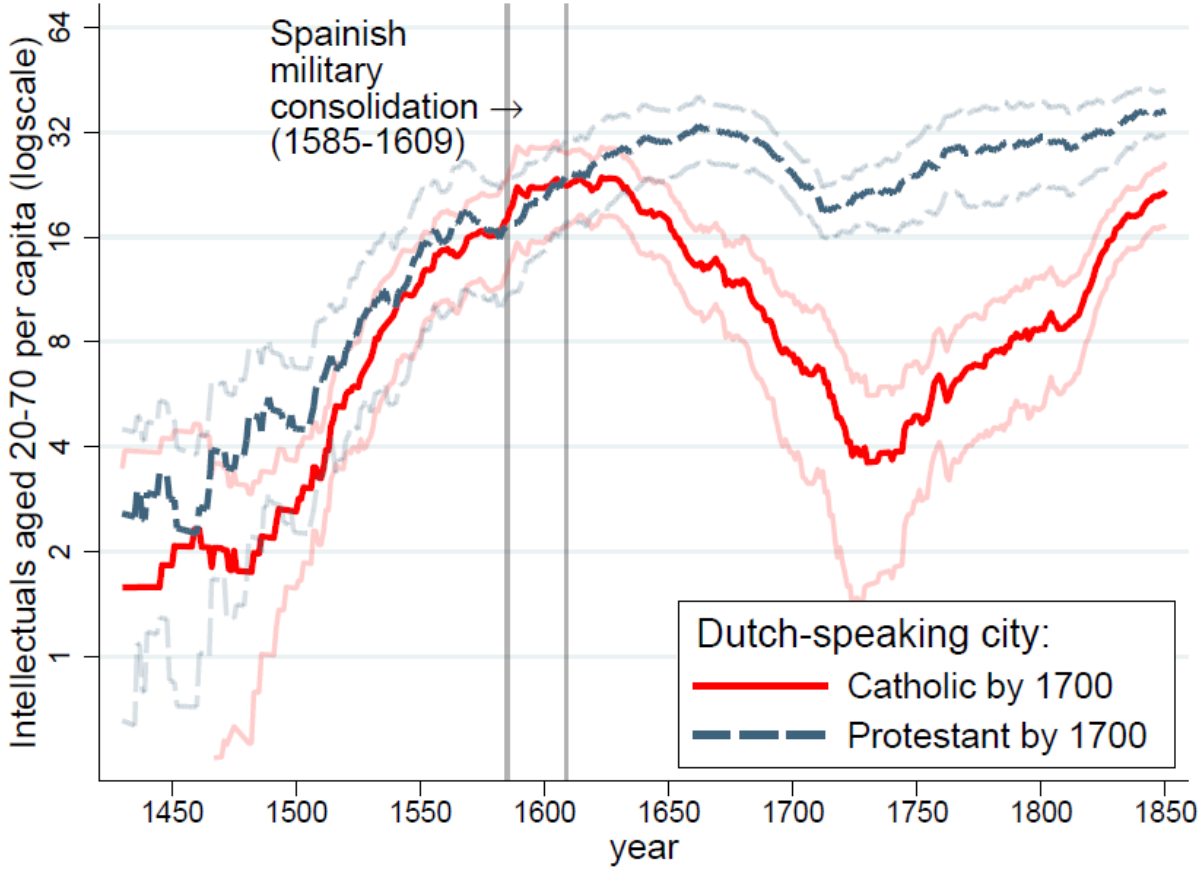


Other age intervals here. Source: Cabello 2023

- 1517: Charles V titled "Holy Roman Empire" by the pope
- 1517: Luther's 95 Theses
  - More Protestant sects emerge
- 1521: Edict of Worms
  - Luther = "the Devil itself"
  - Protestantism banned
  - Persecution

Back

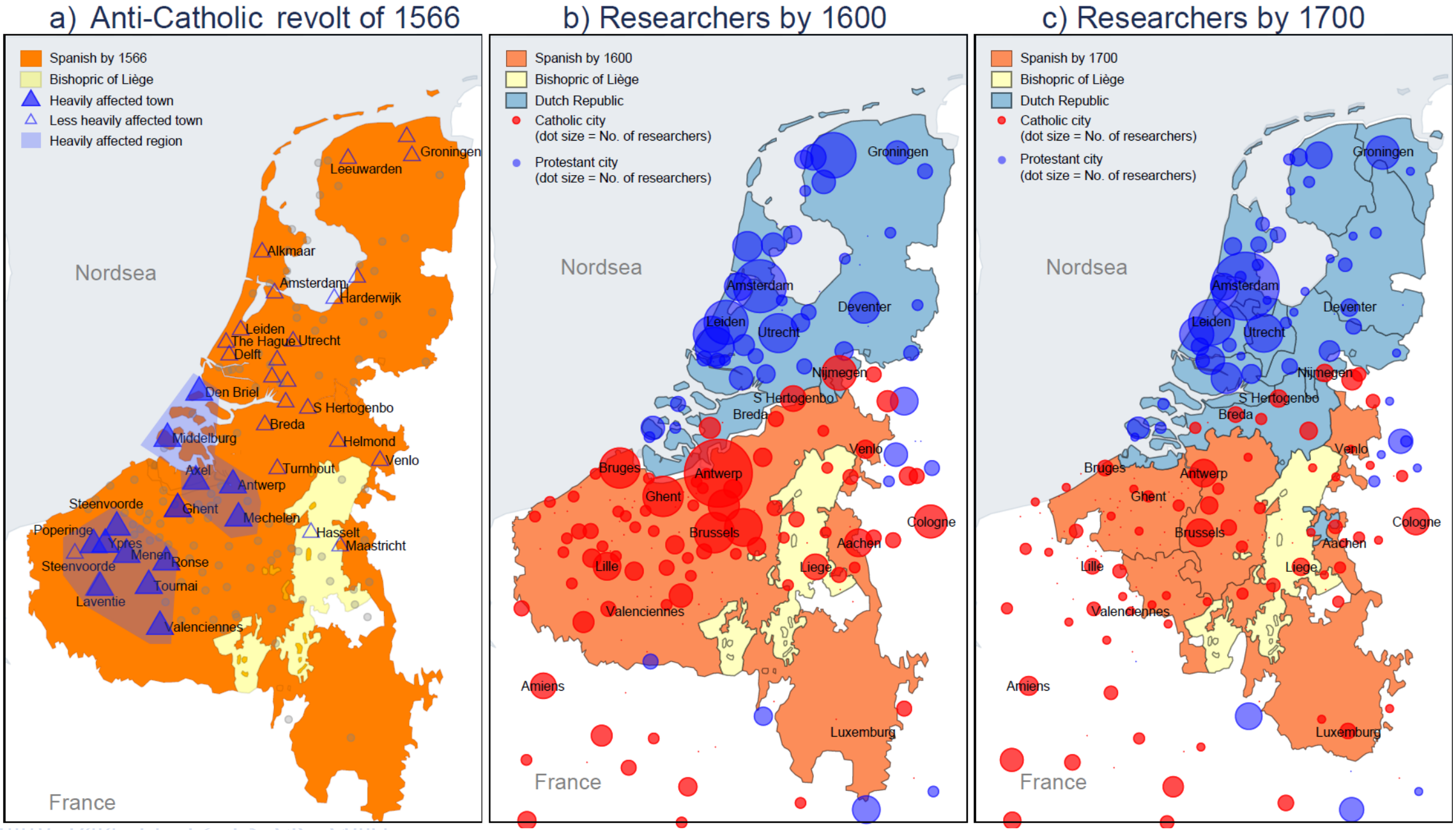
Case study: Low Countries



Source: Cabello 2023

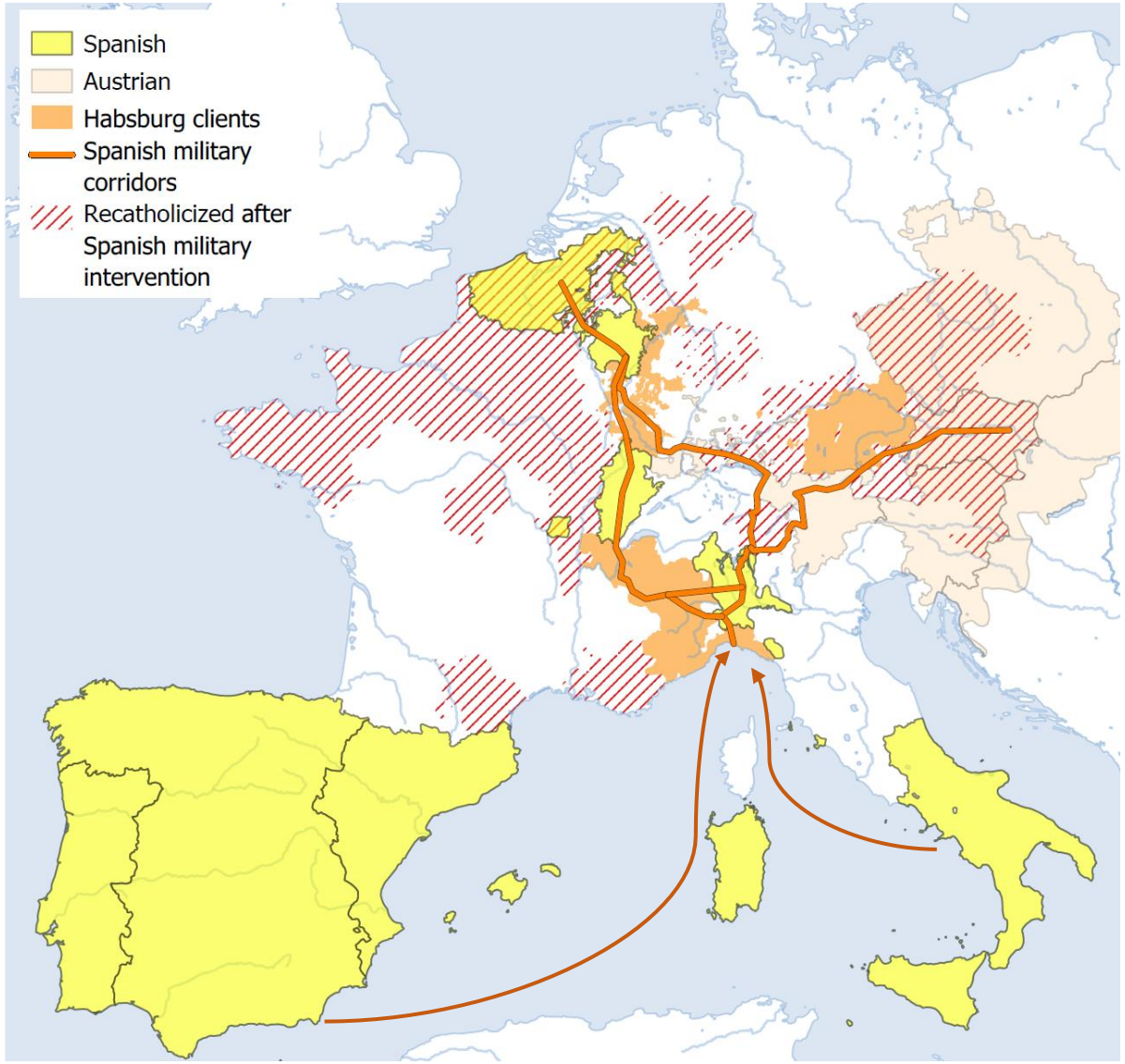
- 1517: Charles V titled "Holy Roman Empire" by the pope
- 1517: Luther's 95 Theses
  - More Protestant sects emerge
- 1521: Edict of Worms
  - Luther = "the Devil itself"
  - Protestantism banned
  - Persecution

Back



Source: Cabello 2023

Back



Source: Cabello 2023

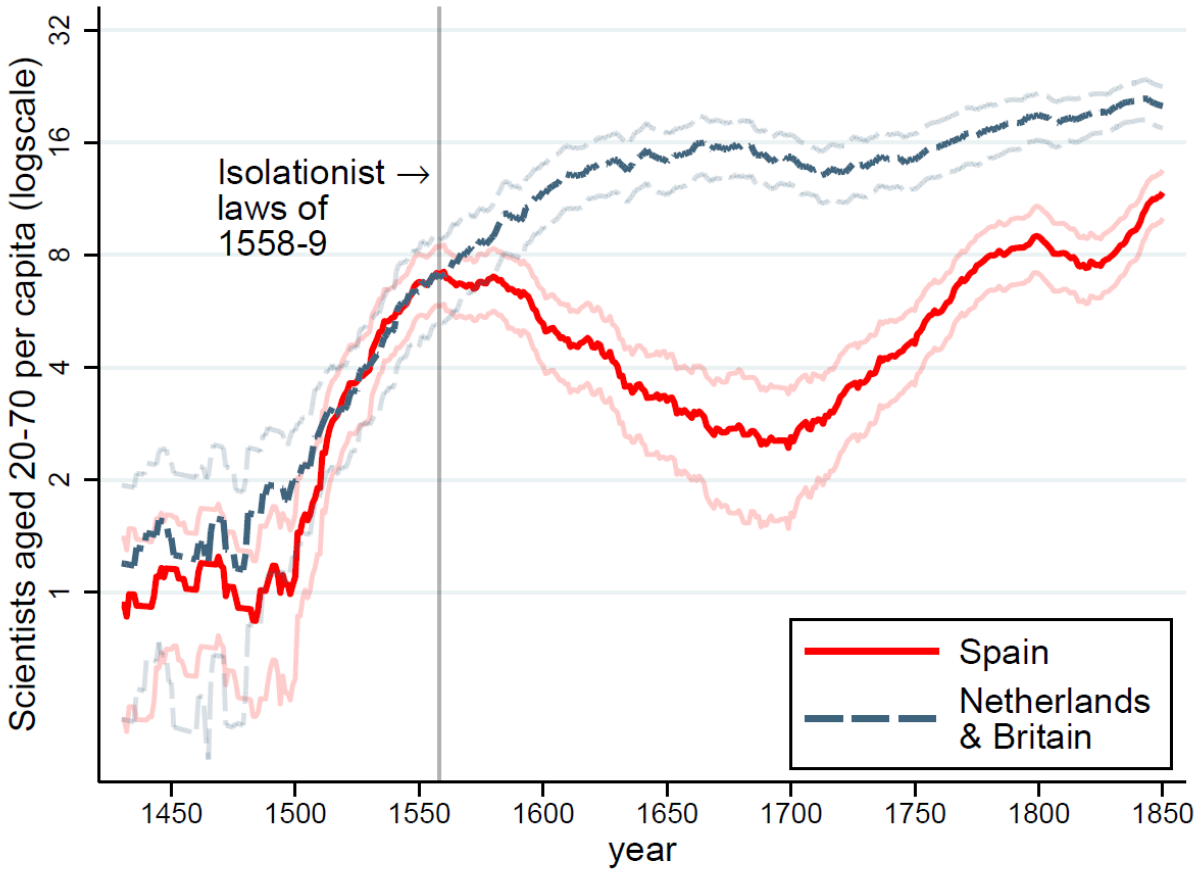
Geographically determined:

Spanish troops came from the south

Natural boundaries in the north

Back

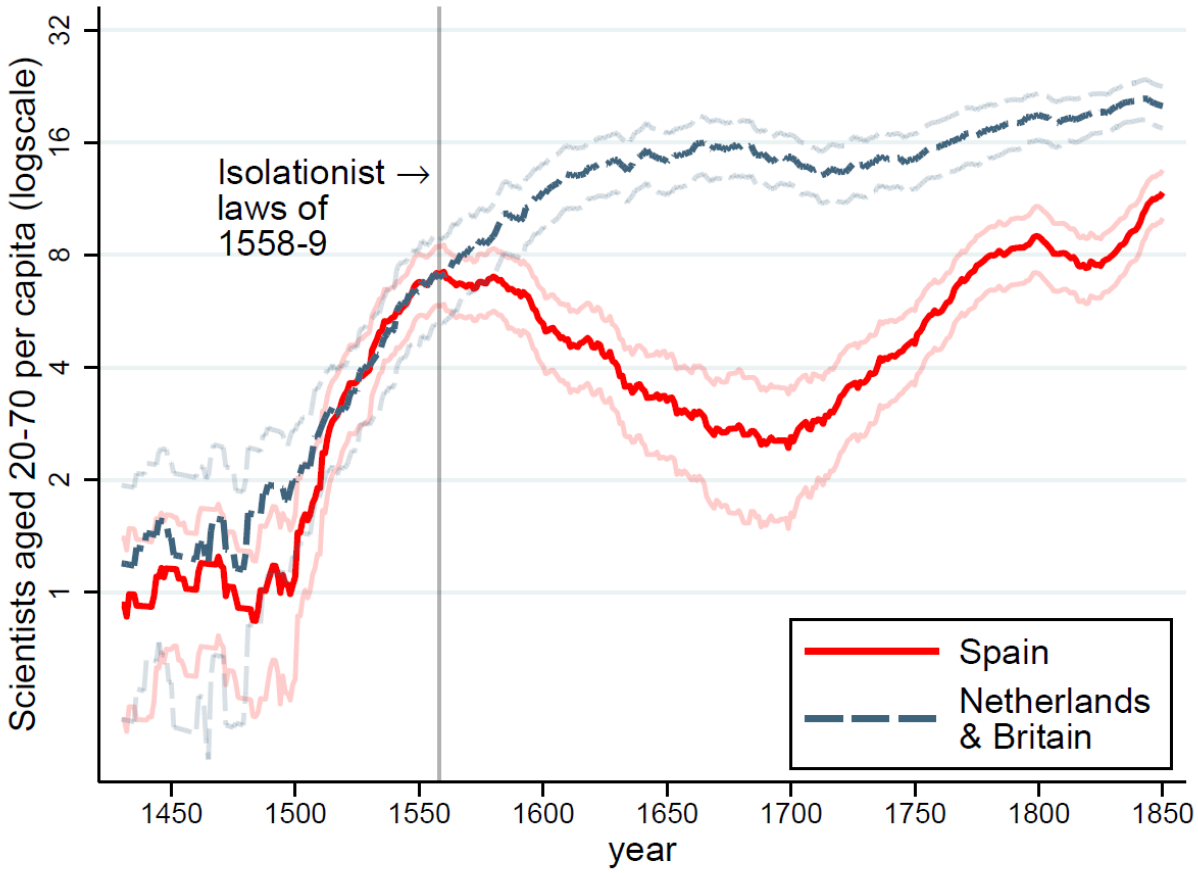
Case study: Spain



Source: Cabello 2023

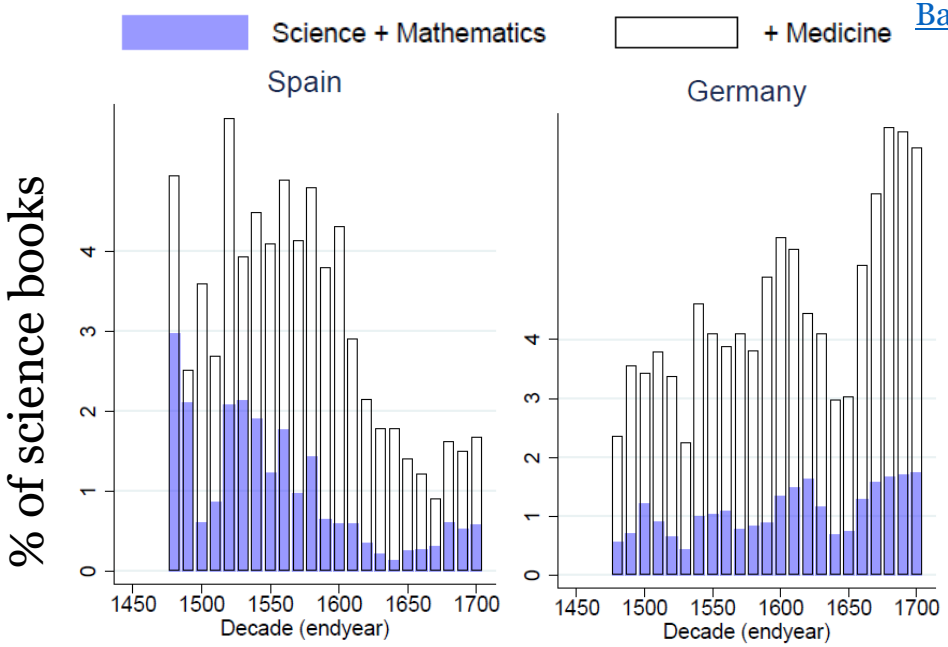
- 1557-58 - Protestant cells discovered in Spain!
- 1559-1632 - Indexes prohibiting literature become increasingly comprehensive.
- 1559 - *Ban to study abroad* imposed on Castile (on Aragon in 1568).

Case study: Spain

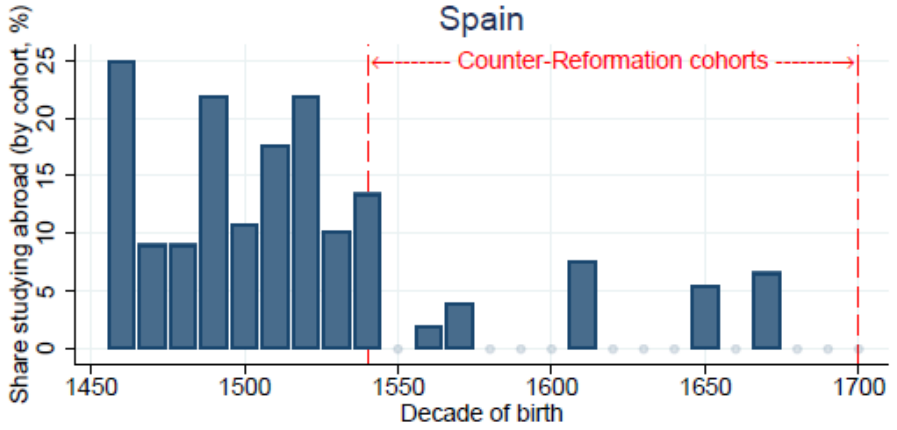


Source: Cabello 2023

Back

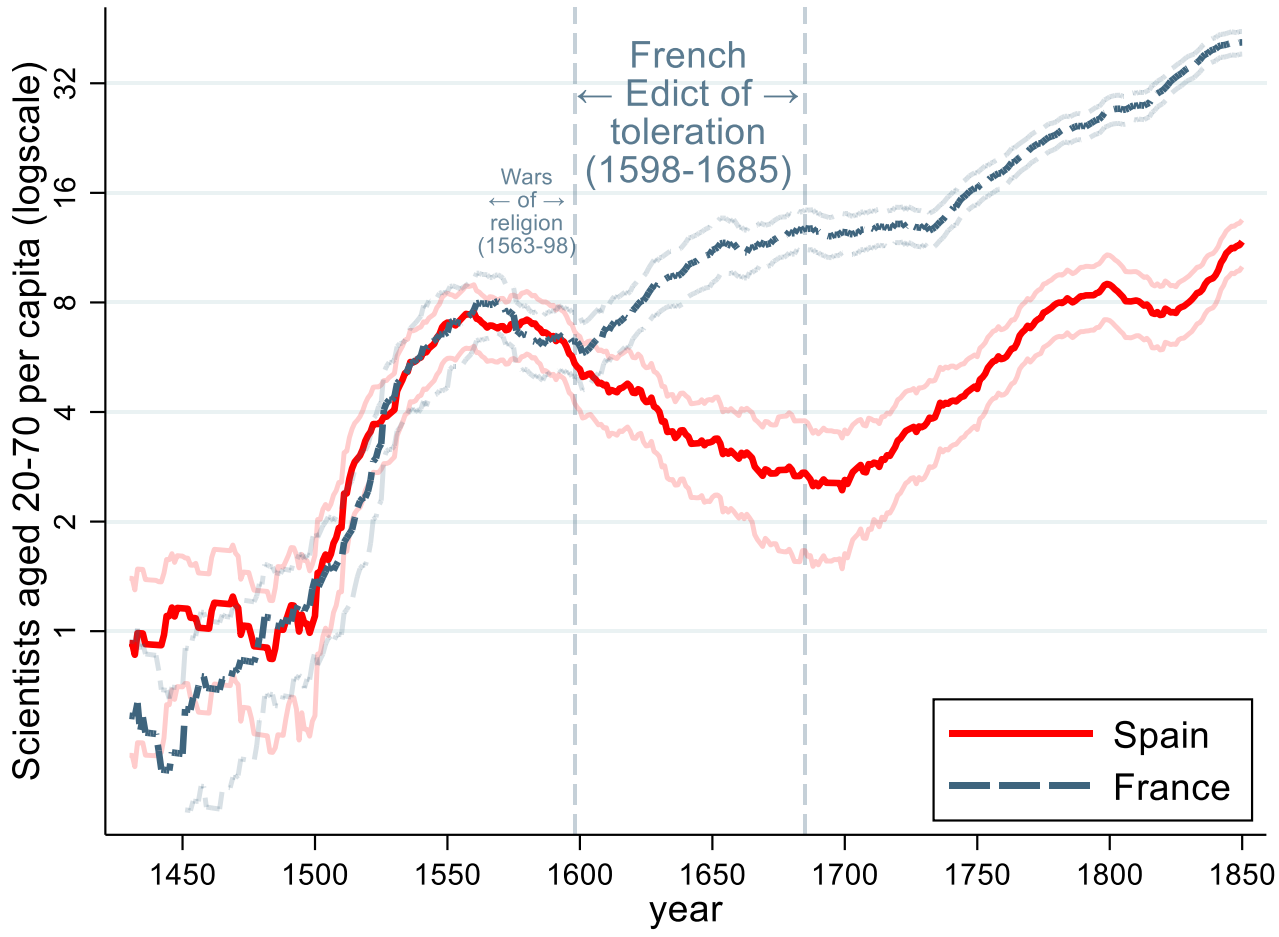


% locals studying abroad



Back

Case study: France

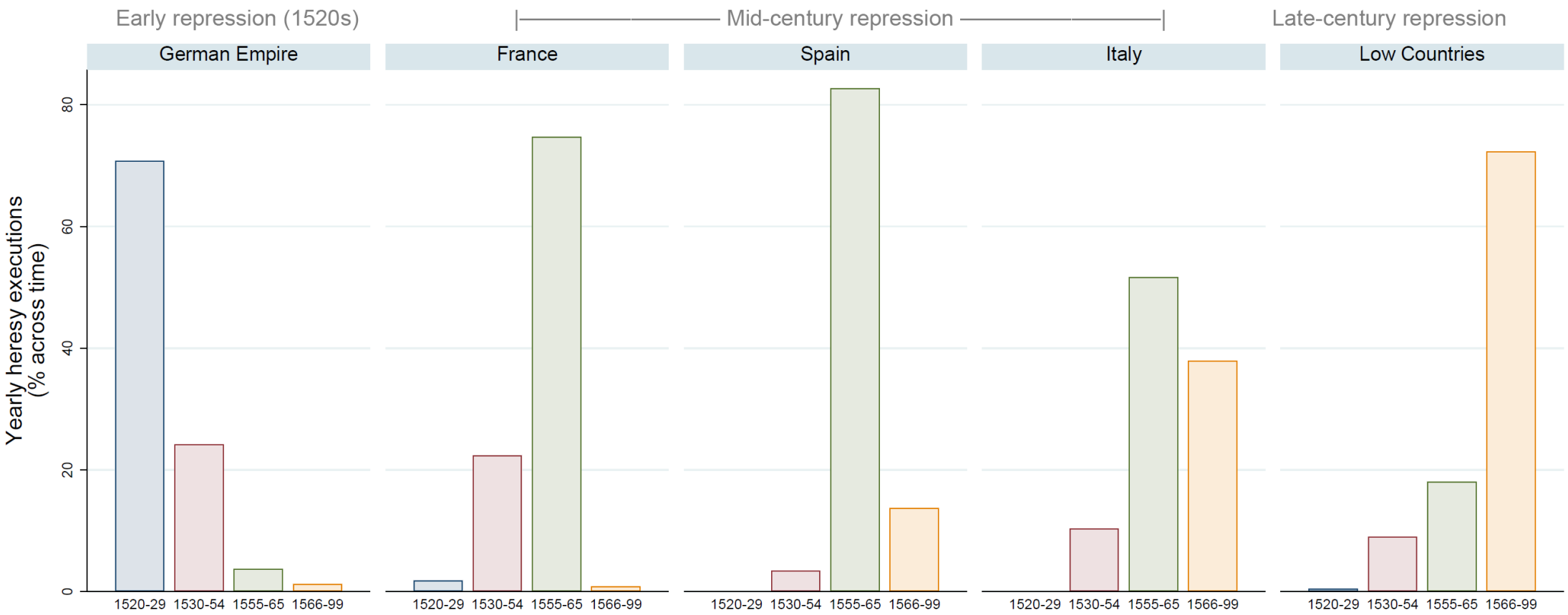


Source: Cabello 2023

- 1598: Edict of Nantes
  - religious toleration!
  - right to workship, educate, even self-defence.
- 1628: la Rochelle's siege
  - Protestants weakened
- 1685: Rights revoked

Back

Timing of heresy persecution



Source: Cabello 2023

Table 1

Back

	Dependent variable: Change in scientists p.c. from 16th to 17th century								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All cities	Religious border (100km)	All cities	Nearby Catholics (100km)	Iberia	Italy	All cities	Dutch border (100km)	All cities
Counter-Ref. intensity									
Catholic ruler 1600	-0.59***	-0.73***	-0.18				-0.24*		0.04
Strictly Catholic regime			-0.48***				-0.33***		-0.32**
Inquisitorial tribunal			-0.40***	-0.36***	-0.51*	-0.36***	-0.46***		-0.37***
Spanish Empire 1600						-0.61***	-0.35***	-0.55***	-0.36***
Catholic university 1700									-0.53***
Catholic pop. share [0,1]									-0.44***
Controls									
University in 1700	0.18**	0.35*	0.24***	-0.05	0.12	-0.07	0.25***	0.43***	0.58***
Dist. to Atlantic	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dist. to Mediterranean	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initial researchers p.c.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Printing volume (by 1500)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pop. growth 1600–1700	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pop. growth 1500–1700	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethno-linguistic FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fluv. catchment region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	649	172	649	171	43	105	649	75	641
R-squared	0.46	0.50	0.48	0.51	0.55	0.53	0.49	0.40	0.51

Notes: Spatial-autocorrelation-adjusted standard errors within 200 km based on Colella et al. (2019). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: Cabello 2023

Table 1

Back

	Dependent variable: Change in scientists p.c. from 16th to 17th century								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All cities	Religious border (100km)	All cities	Nearby Catholics (100km)	Iberia	Italy	All cities	Dutch border (100km)	All cities
Counter-Ref. intensity									
Catholic ruler 1600	-0.59***	-0.73***	-0.18				-0.24*		0.04
Strictly Catholic regime			-0.48***				-0.33***		-0.32**
Inquisitorial tribunal			-0.40***	-0.36***	-0.51*	-0.36***	-0.46***		-0.37***
Spanish Empire 1600						-0.61***	-0.35***	-0.55***	-0.36***
Catholic university 1700									-0.53***
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Controls									
University in 1700	0.18**	0.35*	0.24***	-0.05	0.12	-0.07	0.25***	0.43***	0.58***
Dist. to Atlantic	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dist. to Mediterranean	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initial researchers p.c.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Printing volume (by 1500)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pop. growth 1600–1700	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pop. growth 1500–1700	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethno-linguistic FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fluv. catchment region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	649	172	649	171	43	105	649	75	641
R-squared	0.46	0.50	0.48	0.51	0.55	0.53	0.49	0.40	0.51

All these capture **logistic** capabilities

Source: Cabello 2023

Notes: Spatial-autocorrelation-adjusted standard errors within 200 km based on Colella et al. (2019). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Back

	Dependent variable: Change in scientists p.c. from 16th to 17th century									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	All cities	Religious border (100km)	All cities	Nearby Catholics (100km)	Iberia	Italy	All cities	Dutch border (100km)	All cities	All cities
Counter-Ref. intensity										
Catholic ruler 1600	-0.59***	-0.73***	-0.18				-0.24*		0.04	0.12
Strictly Catholic regime			-0.48***				-0.33***		-0.32**	-0.31**
Inquisitorial tribunal			-0.40***	-0.36***	-0.51*	-0.36***	-0.46***		-0.37***	-0.37***
Spanish Empire 1600						-0.61***	-0.35***	-0.55***	-0.36***	-0.37***
Catholic university 1700									-0.53***	-0.54***
Catholic pop. share [0,1]									-0.44***	-0.51***
Controls										
University in 1700	0.18**	0.35*	0.24***	-0.05	0.12	-0.07	0.25***	0.43***	0.58***	0.59***
Prote. with 10%–50% Cath.										0.18***
Some Calvinists (> 1%)										0.03
Mostly Calvinists (> 50%)										-0.07
Fully Calvinist (> 80%)										-0.29***
Dist. to Atlantic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dist. to Mediterranean	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initial researchers p.c.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Printing volume (by 1500)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pop. growth 1600–1700	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pop. growth 1500–1700	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ethno-linguistic FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fluv. catchment region FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	649	172	649	171	43	105	649	75	641	641
R-squared	0.46	0.50	0.48	0.51	0.55	0.53	0.49	0.40	0.51	0.51

Notes: Spatial-autocorrelation-adjusted standard errors within 200 km based on Colella et al. (2019) . * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Catholic minorities beneficial

Full Protestant control also detrimental

Source: Cabello 2023

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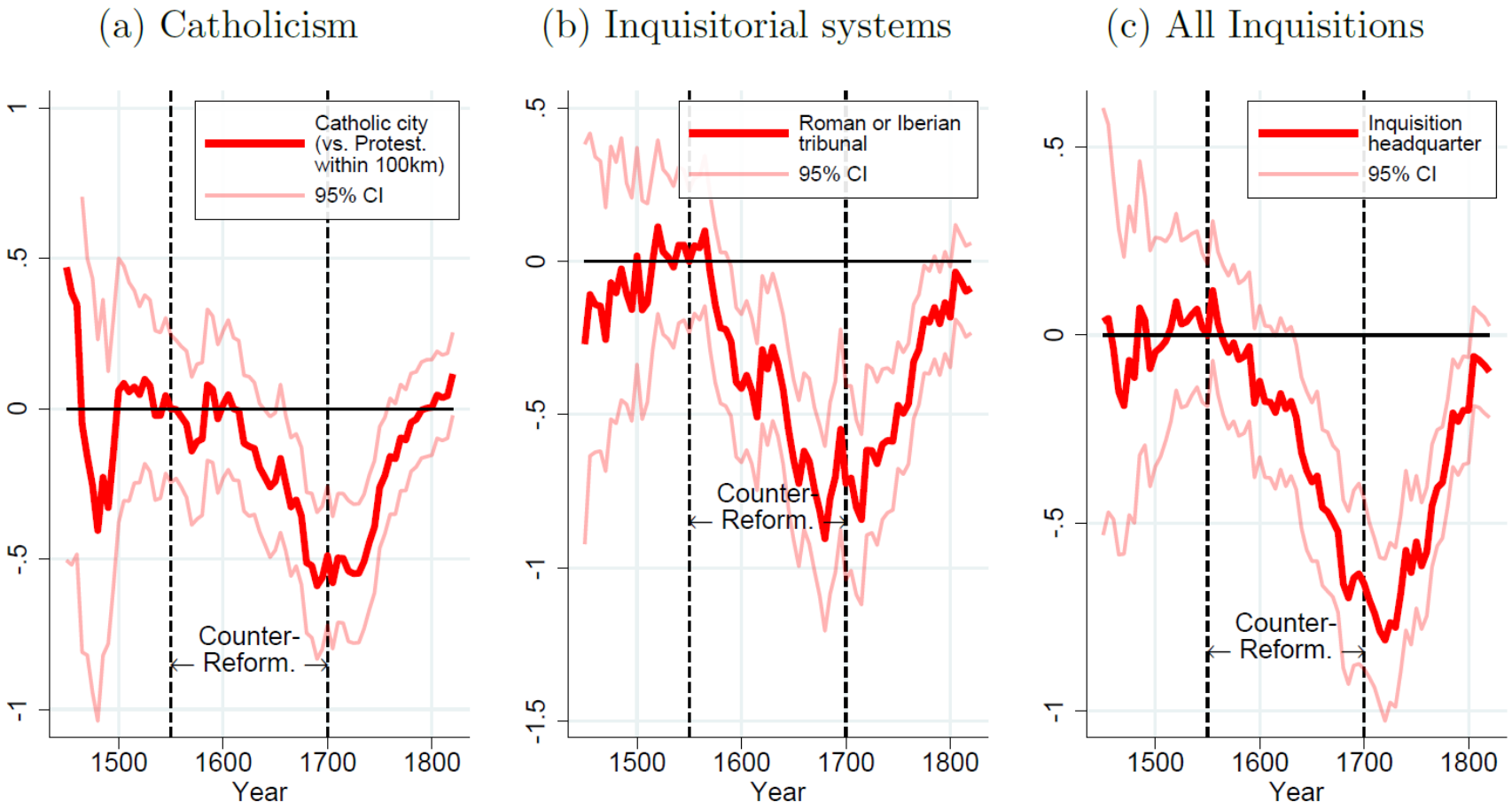
Dynamic regressions

$$\ln\left(\frac{\text{Researchers aged 20-70}_{it}}{\text{Population}_{it}}\right) = \alpha_{0t} + \alpha_{1t} D(\text{CR-proxy}_i) + \text{controls}_{it} + \text{error}_{it}$$



Source: Cabello 2023