Seeds of knowledge: scholars, universities, and academies in premodern Europe

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European Research Council
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Europe, 1000–1800 CE: A Hub of Academic Innovation

- Over >**100,000 academic scholars** across Europe during this period.
  among whom 39% have a footprint in today's libraries
- Scholars did not work in isolation: they were part of a **vast academic community**
- 1000-1200: cathedral and monastic schools. Outcompeted as learning centers c. 1200.
- Over 1000-1800:
  - **200 universities** established (1000–1800, e.g. Bologna, Paris, Oxford, Louvain, Kraków, Salamanca, Coimbra, Prague).
  - **150 notable academies** (1500–1800, e.g. Royal Society, Leopoldina, Ricovrati, Académie des Sciences).

Key features of universities

Many are bottom-up. Recognized *ex post* by a charter (e.g. Papal Bull)

Very unique feature: they are *persona ficta* ($\approx$ legal persons/corporations)
Origin: Roman law (*universitas*) + Canon law (church as *corpus mysticum* of Christ)

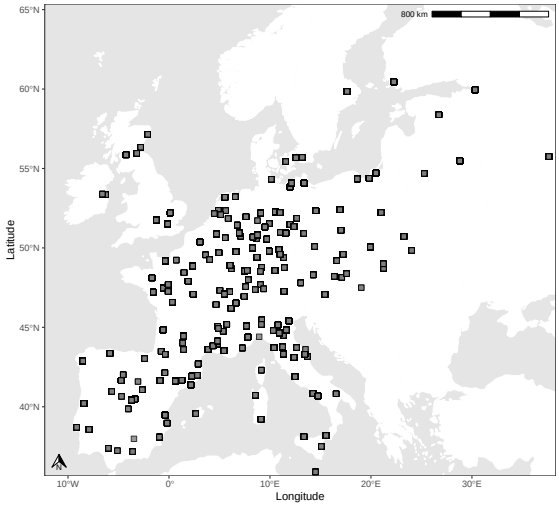
In corporations, professors act collectively. + one can leave a corporation.
The institution persists beyond the existence of its members (universities more persistent than States)

Diplomas follow exams. Given by institutions (hence by community of masters)

Some dose of meritocracy (disputatio, exams)

Fields: law, theology, medicine (3 higher faculties), arts (with some science)

Universities



Universities across Europe shared remarkable similarities

- Latin (until late in the 18th century)
- *licentia ubique docendi*
- similar curricula
- Charters and Bulls (giving autonomy)
- ritual: sceptres, gowns, etc..
- students' nations with initiation ritual



student rituals in Aveiro (2026)



University of Paris, 1253. Virgin and Child + with masters and scholars.



University of Oxford, c. 1300. Chancellor seated among scholars.

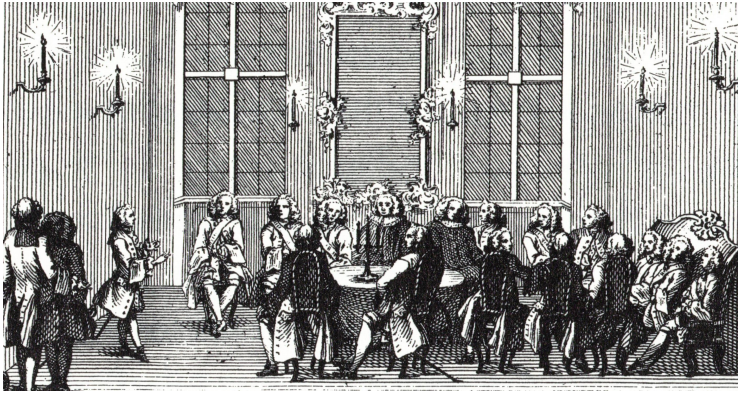


University of Coimbra. A 1897 redrawing based on the medieval design.

University seals, witnessing the recognition of the university as a collective legal entity

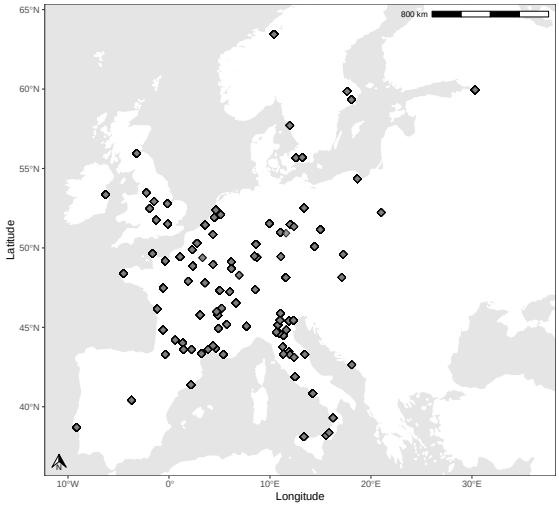
Academies

Academies: informal clubs becoming formal institutions after 1650.
Mostly arts & sciences (+ applied) – Meetings, publications, letters, prizes



meeting of the academy
in Copenhagen (1751)

Academies


800 km
65°N
60°N
55°N
50°N
45°N
40°N
Latitude
10°W
0°
10°E
20°E
30°E
Longitude

Data collection: where we stand (Sep 2026)

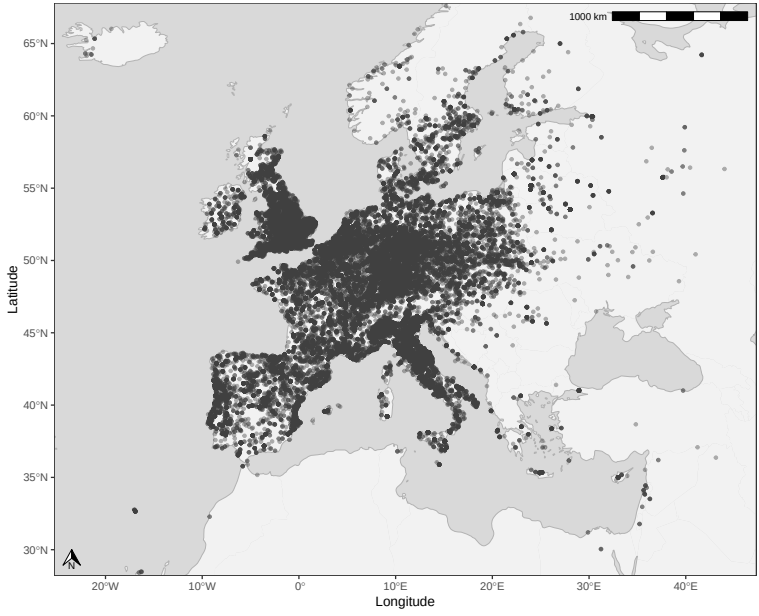
Data collected from 728 secondary sources

`https://rete.uclouvain.be/`

- **381** institutions
- c. 94000 Scholars and Literati (21k in academies, 77k in universities, 4k both)
- c. 112000 Activities, each activity representing the presence of a scholar in one institution

Geographical coverage

Places of birth:



Originality of the database

- bottom-up construction $\neq$ top-bottom (Laouenan et al. 2022), Serafinelli-Tabellini (2022)
- Teachers, not students
- Intersection Universities – Academies
- European scope
- Linking scholars with productivity measures (publications in VIAF, occupations listed in Wikidata)

Combine 11 measures of production & notoriety through PCA

Variable (in asinh)	PC1	PC2
Wikipedia: No. characters of longest page (*LengthWikiN*)	0.29	-0.01
Wikipedia: No. pages in different languages (*NWikiLanguage*)	0.26	-0.46
VIAF: No. publication countries (*countries*)	0.33	0.04
VIAF: No. different publishers (*publishers*)	0.32	0.23
VIAF: No. titles (*titles*)	0.33	0.20
VIAF: No. coauthors (*coauthors*)	0.32	0.27
VIAF: No. isbn (*isbn*)	0.24	-0.66
VIAF: No. publications before 1900 (*pubbef1900*)	0.32	0.17
VIAF: No. publications after 1900 (*pubaft1900*)	0.29	-0.34
Wikidata: No. of identities / external ids (*nidentities*)	0.31	0.18
Wikidata: No. of occupations (*noccupations*)	0.30	0.11
Eigenvalue	8.46	0.91
Proportion of Variance explained	0.77	0.08

Human capital index

$$
\begin{aligned}
q_i \;=\; & -1.53 + 0.29\ \mathit{LengthWikiN} + 0.26\ \mathit{NWikiLanguage} + 0.33\ \mathit{countries} \\
& +0.32\ \mathit{publishers} + 0.33\ \mathit{titles} + 0.32\ \mathit{coauthors} \\
& +0.24\ \mathit{isbn} + 0.32\ \mathit{pubbef1900} + 0.29\ \mathit{pubaft1900} \\
& +0.31\ \mathit{nidentities} + 0.30\ \mathit{noccupations} \qquad (1)
\end{aligned}
$$

- Seen from the point of view of today
- Includes both output and citations
- Measurement errors, mitigated by combining 11 variables
- Based on digitally-native sources, hence subject to updates
- Bias: printing press, non academic works (von Schiller, Rabelais, Swift)



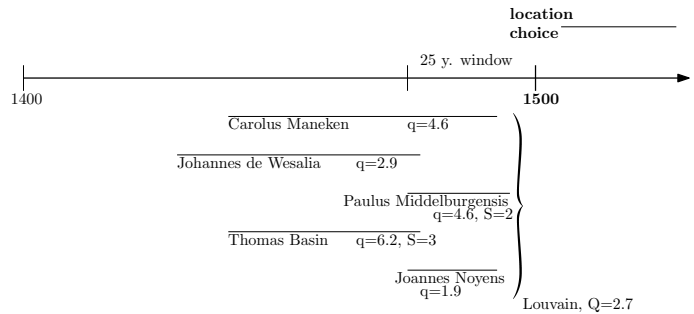
Ranking of top scholars

Ranking	Scholar	Institution	Index (q_i)
1	Luther	U. Wittenberg	19.96
2	Voltaire	15 academies	19.53
3	Aquinas	U. Paris	19.15
4	von Schiller	U. Jena	19.12
5	Kant	U. Königsberg	18.99
6	Swift	A. Dublin	18.92
7	Diderot	A. Prussia	18.72
8	Erasmus	U. Louvain	18.7
9	Machiavelli	A. Plato	18.62
10	Descartes	A. Mersenne	18.57

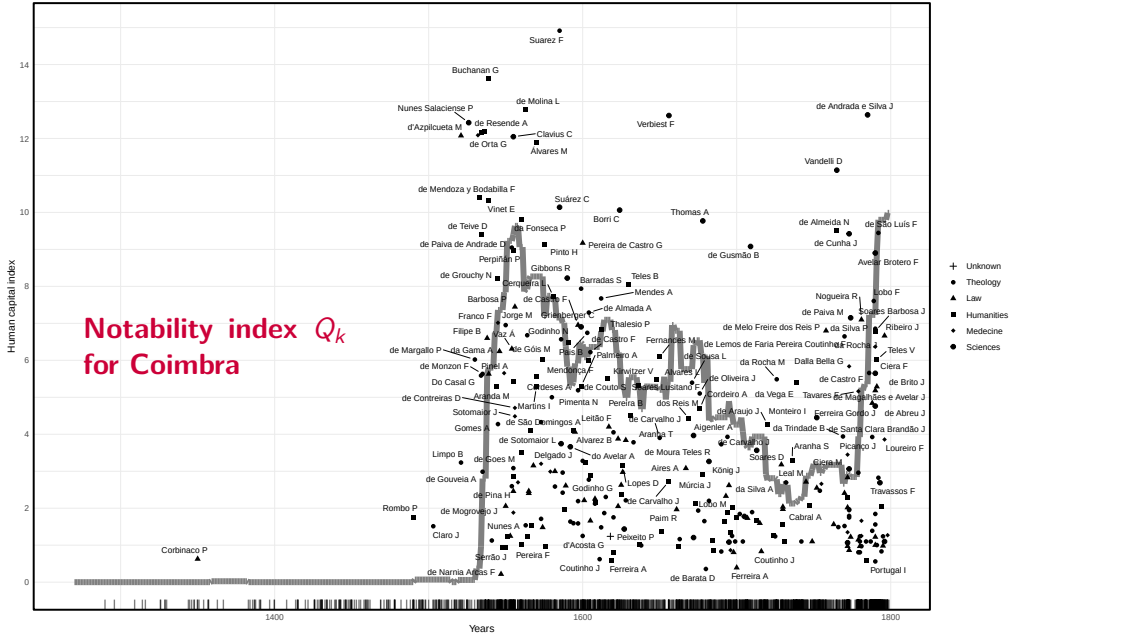
Notability index Q_k

At time t, the notability Q_{kt} of a university k aggregates the q_i of the top 5 persons who were active at any point $\in [t-25, t[$

$$Q_{kt} = \sqrt{\sum_{i=1}^{5} \frac{1}{5} \left(\frac{q_i}{S_i}\right)^2}$$



This measure is not sensitive to how many obscure scholars work at k


Notability index Q_k for Coimbra
Human capital index
Years
0
2
4
6
8
10
12
14
1400
1600
1800
Unknown
Theology
Law
Humanities
Medecine
Sciences
Suarez F
Buchanan G
de Molina L
Nunes Salaciense P
de Resende A
d'Azpilcueta M
Clavius C
de Orta G
Álvares M
Verbiest F
de Andrada e Silva J
Vandelli D
de Mendoza y Bodabilla F
Suárez C
Vinet E
Borri C
Thomas A
de Almeida N
de São Luís F
de Teive D
da Fonseca P
de Paiva de Andrade D
Pereira de Castro G
de Cunha J
Pinto H
de Gusmão B
Avelar Brotero F
Perpiñá P
Gibbons R
de Grouchy N
Barradas S
Teles B
Nogueira R
Lobo F
Barbosa F
de Castro F
Mendes A
de Paiva M
Soares Barbosa J
Franco F
Jorge M
Grindeberger
de Almada A
Thalesio P
da Silva R
Ribeiro J
Filipe B
Vaz A
Godinho J
de Castro F
Fernandes M
de Melo Freire dos Reis P
Teles V
de Margallo P
da Gama A
de Góis M
Reis B
Palmeiro A
de Lemos de Faria Pereira Coutinho C
de Rocha J
Ciera F
de Monzon F
Pinel A
Mendonça F
Kirwitzer V
Álvares J
de Sousa L
da Rocha M
Dalla Bella G
de Brito J
Do Casal G
Cardoses A
de Couto S
Silveira
Lusitano F
de Oliveira J
de Castro F
de Contreiras D
Aranda M
Pimenta N
Pereira D
dos Reis M
Cordeiro A
da Vega E
Tavares F
de Matthaes e Avelar J
Martins I
de Araujo J
Monteiro I
Ferreira Gordo J
de Abreu J
Sotomaior J
de São Domingos A
Leitão F
de Carvalho J
da Trindade B
de Santa Clara Brandão J
Gomes A
Algenier A
de Sotomaior L
Alvarez B
Aranha T
de Canal J
Araújo S
Picanço J
Loureiro F
Limpo B
de Goes M
Delgado J
do Avelar A
de Moura Teles R
Soares D
Bicira M
de Gouveia A
Aires A
König J
Leal M
de Pina H
Godinho G
Lopes D
Murcia J
da Silva A
Travassos F
Rombo P
de Mogrovejo J
de Carvalho J
Lobo M
Cabral A
Paim R
Nunes A
Claro J
Peixeito P
Corbinaco P
d'Acosta G
Serrão J
Pereira F
Coutinho J
Ferreira A
Coutinho J
de Narnia Arcas F
de Barata D
Ferreira A
Portugal I

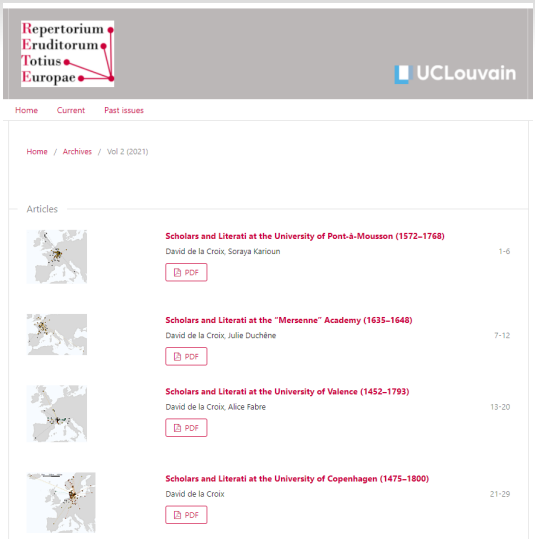
RETE

When data collection completed for one institution we produce a data sheet

Database available at:

`https://shiny-lidam.sipr.ucl.ac.be/rete/`

Soon linked with Wikidata pages



Nepotism vs Intergenerational transmission of human capital

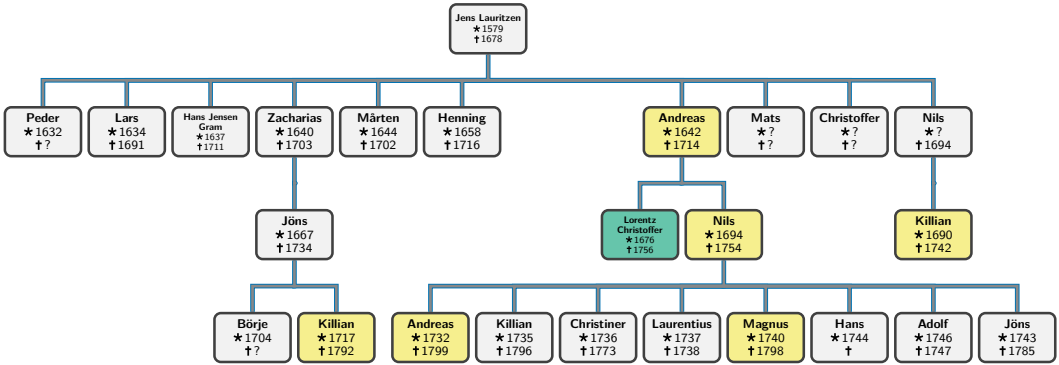
Meritocracy is essential for universities to flourish.
Anecdotal evidence suggests it was present from the beginning.
We show a decreasing importance of nepotism among father-sons in academia.
$\rightarrow$ Rise of meritocracy

Many father-son pairs in academia: Bernoullis, Eulers, Cassinis, Bartholin
We find c. 2000 father-son(s) in same institution (university or academy)

Question: Did fathers secure jobs for their son ahead of better candidates (nepotism)? or talent was scarce and scholars' sons inherited endowments of human capital ?

$\triangleright$ de la Croix and Goñi, Nepotism vs. Intergenerational Transmission of Human Capital in Academia (1088-1800), *Journal of Economic Growth*, **29**, 469–514, 2024

The Stobaeus family. Professors at Lund (yellow squares) & members of Academy in Stockholm (green)



A structural model

Need for a structural model to disentangle inherited skills from nepotism

Children's human capital: $h_t = \beta h_{t-1} + u_t$,

where β: intergenerational elasticity of human capital.

Consider the universe of families $i \in \mathbb{I}$.

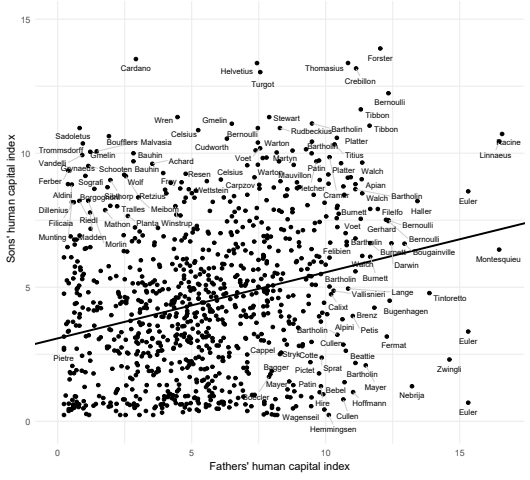
Selection into being a scholar depends of human capital: $h_{t-1} > \tau$

Nepotism: selection criterion is weaker for the sons of scholars: $h_t > \tau - \nu$

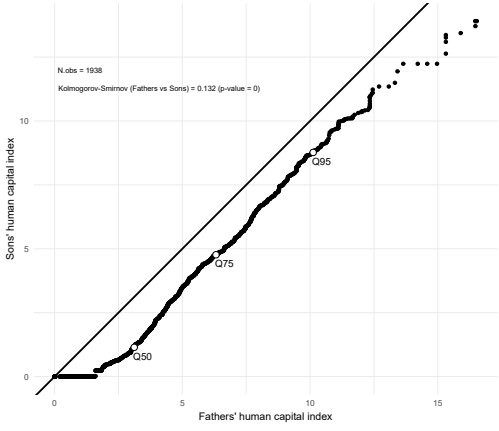
$\rightarrow$ need to identify β and ν

Identifying assumptions

Father-son correlation



Parent-child distributional differences

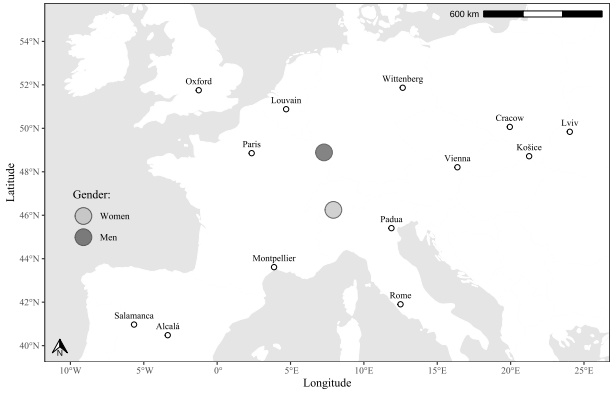


Main results

- High rate of transmission of human capital (≈ 0.63)
- 18.8% scholars' sons are nepotic scholars.
- Nepotism decreased during Scientific Revolution and Enlightenment.
- Nepotism more prevalent in stagnant fields/context.
- $\rightarrow$ meritocracy developed further in the 16-18th centuries.

151 women appear in our database

Not many women in premodern academia, but some.
A surprise: we find them mostly in Catholic institutions



Barycenter of the places of birth

▷ de la Croix and Vitale, Women in European Academia before 1800 - Religion, Marriage, and Human Capital, *European Review of Economic History*, **27**, 506–532 , 2023

Why are Protestant places more conservative w.r.t women?

Protestant social norms for women were not too different from Catholic norms.

The substantial difference was in the formal centralization of decision making.

Women in Protestant communities were subject to the will of their husbands and fathers, under peer pressure – difficult for women to achieve visibility in public space.

The Catholic Church could control women's participation in public space $\rightarrow$ could also make exceptions, which allowed these notable women to emerge.

Integrated market

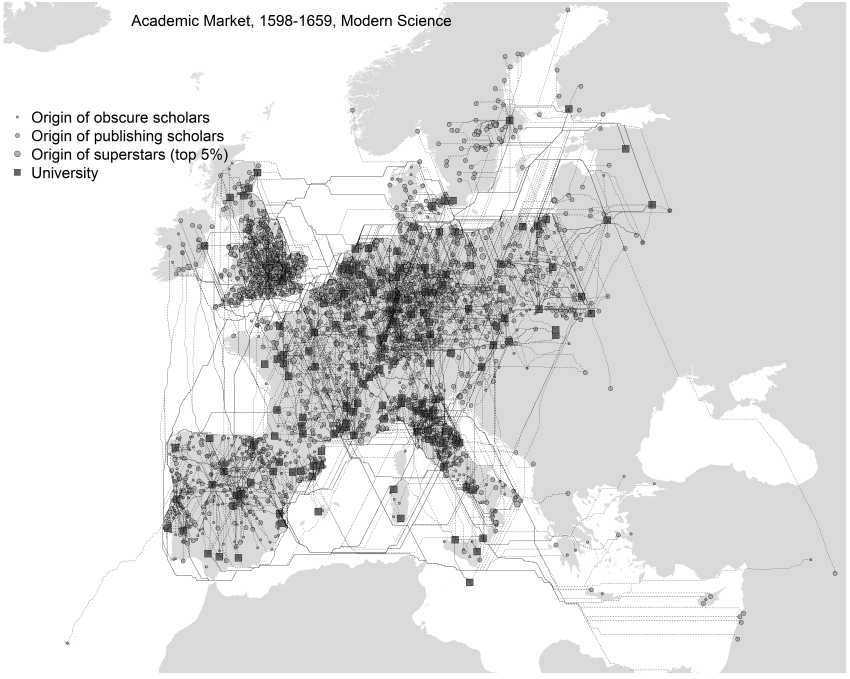
There was an **integrated** academic market since the Middle Ages
Key argument: market forces led the best scholars to agglomerate
Assuming complementarities, this was highly beneficial for knowledge growth

Should help to sustain the needed mobility:

- Political fragmentation of Europe preventing strong control from the top.
- Intellectual unity (use of latin).
- *licentia ubique docendi*, right to teach anywhere with a doctoral degree

Allows to harness together universities and UTHC (upper tail human capital)

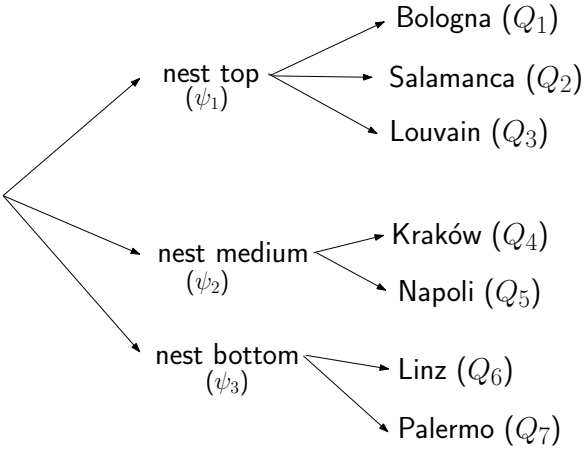
▷ de la Croix, Docquier, Fabre, Stelter, The Academic Market and the Rise of Universities in Medieval and Early Modern Europe (1000-1800), *Journal of the Euro. Eco. Association*, **22**, 1541–1589, 2024


Academic Market, 1598-1659, Modern Science
Origin of obscure scholars
Origin of publishing scholars
Origin of superstars (top 5%)
University

Methodology: nested multinomial logit



scholar with q_i



Determinants of the location choice

The probability for a scholar to go to university k decreases with
– distance from birth
increases with
– notability of k (Q_k)
– gap between individual and institution $(q_i - Q_k)^2 \rightarrow$ positive sorting

$\rightarrow$ high quality scholars are attracted by notable places and agglomerate there

–Simulating agglomeration gains from the market shows large effect during the Middle Ages and the Scientific Revolution

Network of universities

Reformation and Counter-Reformation (ideologies) led to a fragmentation of the academic network
Hence slowing down the mobility of persons and ideas, lowering overall quality

Look at mobility in the data through the lens of graph theory
Let $N = \{1, 2, \ldots, n\}$ be the set of universities in the network g (nodes, exogenous)
For two universities $(i, j) \in N$, we define $g_{ij} \in \{0, 1\}$ as the *link* (edge) between them.
$g_{ij} = 1$ if at least one same scholar has taught in both universities, $g_{ij} = 0$ otherwise.

▷ de la Croix and Morault, Winners and Losers from the Protestant Reformation: An Analysis of the Network of European Universities, *Journal of Economic History*, **86**, 460-500, 2026

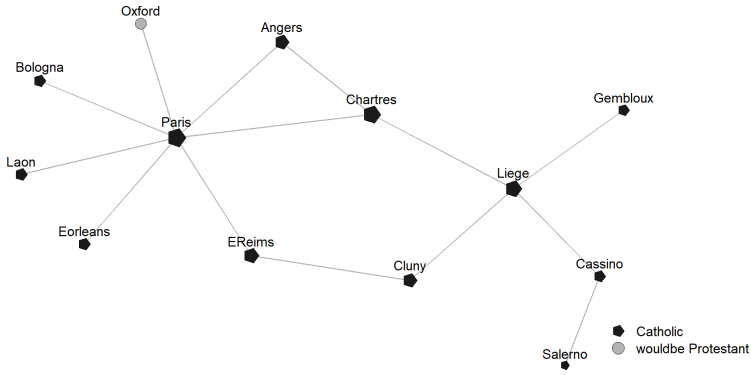
Network 1000-1149

Positioning of universities determined by Fruchterman-Reingold force-directed algorithm.

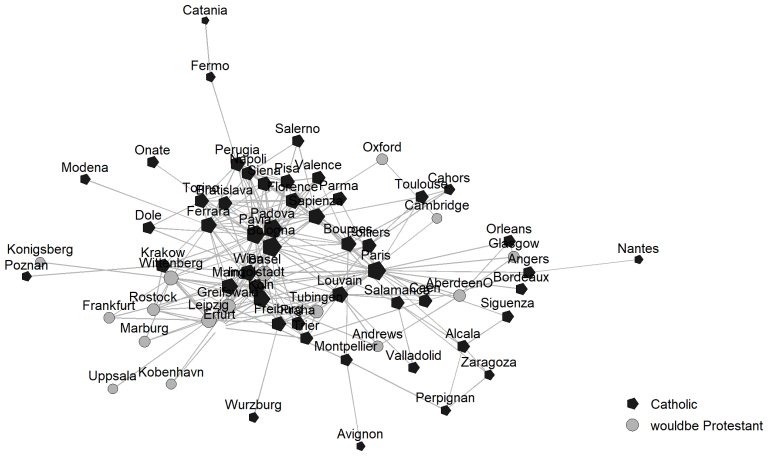
Groups universities more closely together when linked to each other.

Only show big component.

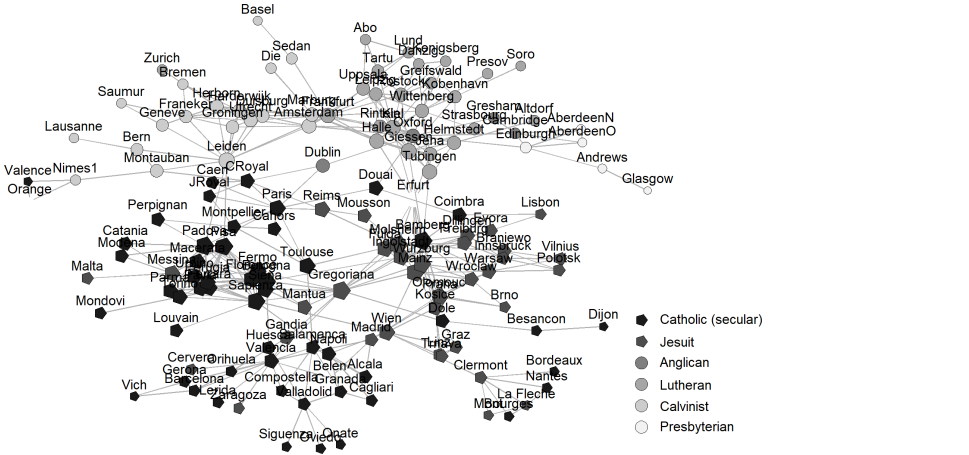
Size of circle proportional to eigenvector centrality.



Network 1453-1517



Network 1660-1715



Main Results

Confessionalization: process by which institutions get a religious identity

- ▷ Religion became a strong determinant of network structure, even when controlling for geography & culture
- ▷ Sharp clear-cut divide between Protestant and Catholic univ
- ▷ Loss of centrality for everyone

Message: universities should cherish diversity and avoid identifying with an ideology

Academies

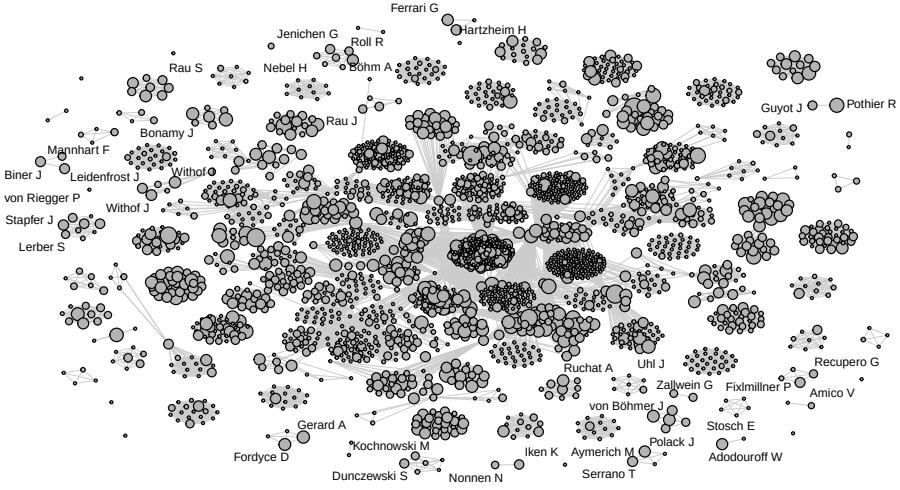
Academies become an important component of the landscape after 1600.

Zanardello (2024) shows that their nature, science vs humanities, mattered for city growth

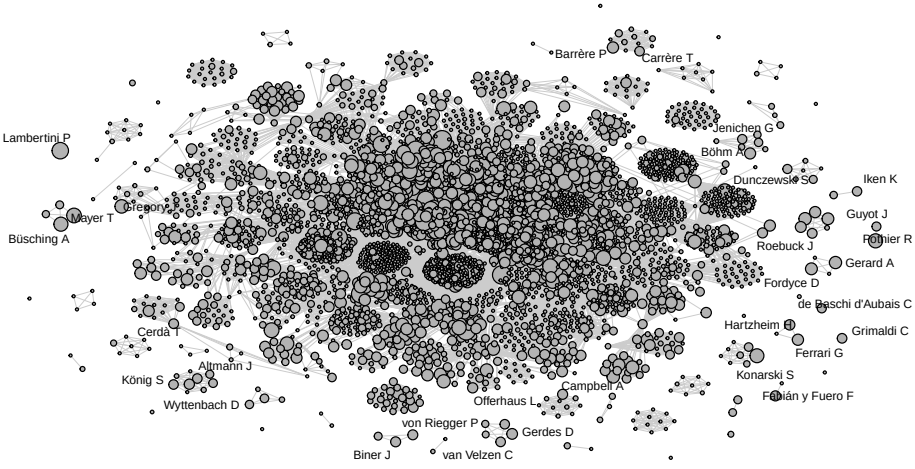
We also show that academies were crucial to connect people and bring universities closer
using a network of persons linked together by common affiliation

▷ de la Croix, Scebba, Zanardello, Flora, Cosmos, Salvatio: Pre-modern Academic Institutions and the Spread of Ideas, CEPR Discussion Paper 20569, 2025

Network 1750 - only universities



Network 1750 - universities & academies



Conclusion

A database allowing to study key aspects of pre-modern European academia as a whole, and their relation to growth:

- market for talent, mobility, agglomeration
- room for meritocracy when needed
- ambivalent role of religions (*persona ficta*, unified market, division, censorship)
- adaptability: when some universities became breathless, academies kicked in

Interaction between institutions is key. That interaction is difficult to perceive when universities, academies, or scholars are studied separately.