

Nepotism vs. Intergenerational Transmission of Human Capital in Academia (1088–1800)

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Families of scholars

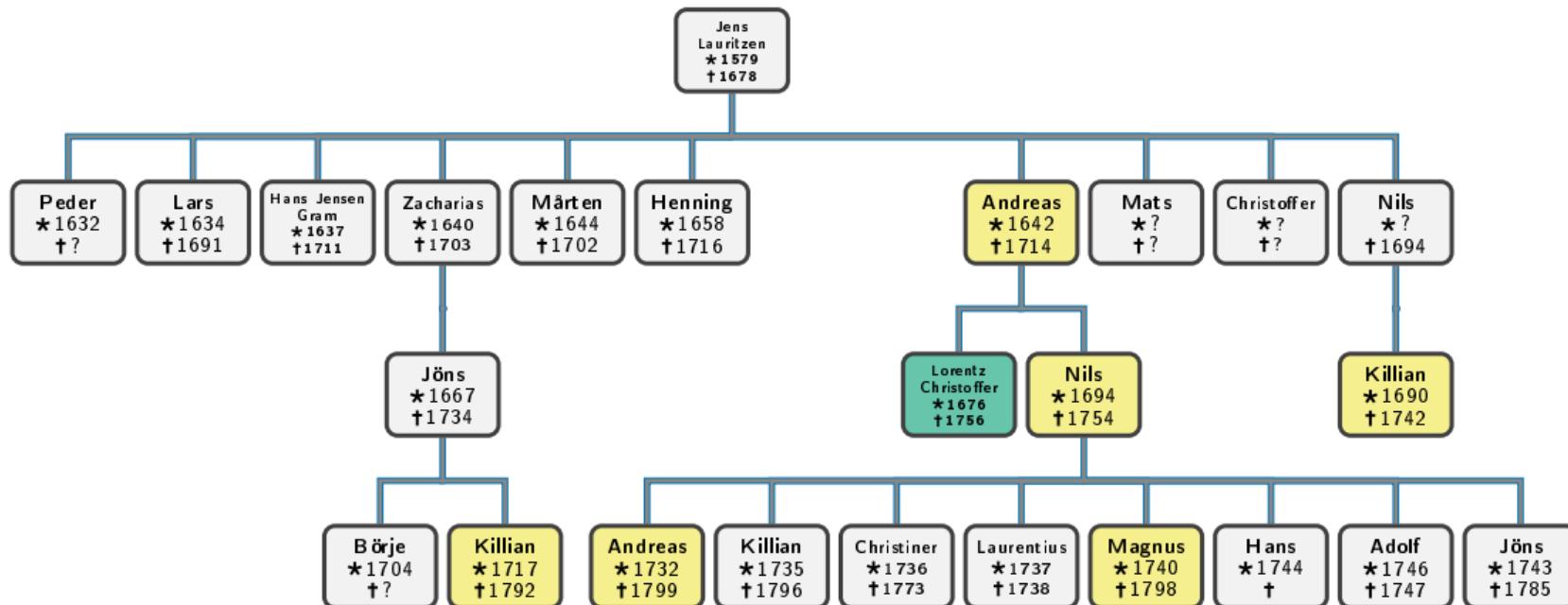
Project on Academia in Pre-industrial Europe. Did Academia foster development?

Father-son pairs – common in academia: Bernoullis, Eulers, Cassinis, Bartholin

Question: Did fathers secure jobs for their son ahead of better qualified candidates (nepotism) ?

or talent was scarce and scholars' sons inherited big endowments of human capital ?

The Stobaeus family. Professors at Lund in yellow squares. Member of Academy in Stockholm in green



Importance

Economic implications are fundamentally different:

- Inherited human capital increases productivity,
- nepotism leads to a misallocation of talent.

Moreover: nepotism = tip of an iceberg, showing the lack of meritocracy in general

Nepotism goes against two important forces that shaped the West (Henrich,2020): greater individualism & competition among voluntary associations

Disentangling inherited human capital from nepotism: challenge

Aim at *measuring*:

- inter-generational persistence of human capital
- importance of nepotism – share of “nepotic” sons

Econometric challenge: these two elements are associated with different biases:

- inherited human capital is unobserved, and only imperfectly reflected in socio-economic outcomes → measurement error.
- nepotism introduces a selection bias, as sons might face lower barriers of entry than fathers.

What we do

- build a database of families of scholars (1088–1800),
- measure their scientific output through publications,
- propose a new method to disentangle nepotism vs. human capital.

Results on full sample

- High rate of transmission of human capital (≈ 0.63)
- 18.8% scholars' sons are nepotic scholars.

Results on sub-sample / heterogeneity

- Nepotism decreases during Scientific Revolution and Enlightenment.
- Nepotism more prevalent in Catholic universities.
- Nepotism less prevalent in new universities, and in Science.

An impossible strategy: compare sons of scholars with other sons

Often unkown father. If known, human capital ??

↳ needed to disentangle human capital transmission from nepotism



Leonhard Euler



Jacques Cassini



Johann Albrecht Euler



César-François Cassini



Joseph Jérôme Lefrançois de Lalande



Isaac Newton



Christoph Clavius

Our strategy: using exclusively father-sons in academia.

exploit multi-generations correlations
exploit parent-child distributional differences



Leonhard Euler



Daniel Mögling



Erasmus Darwin



Johann Albrecht Euler



Johan Ludwig Mögling



Robert Darwin



Michel Chicoyneau



François Chicoyneau



François Aimé Chicoyneau



Giovanni Domenico Cassini



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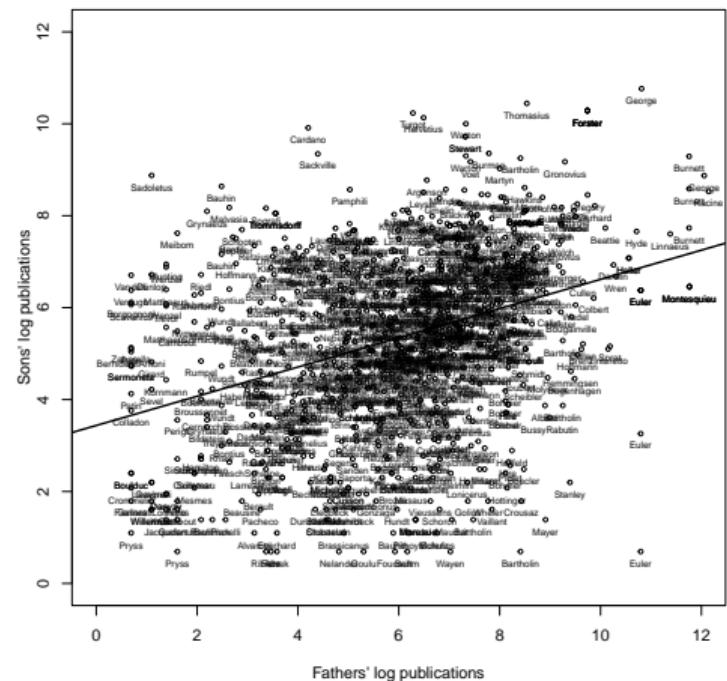
François Aimé Chicoyneau



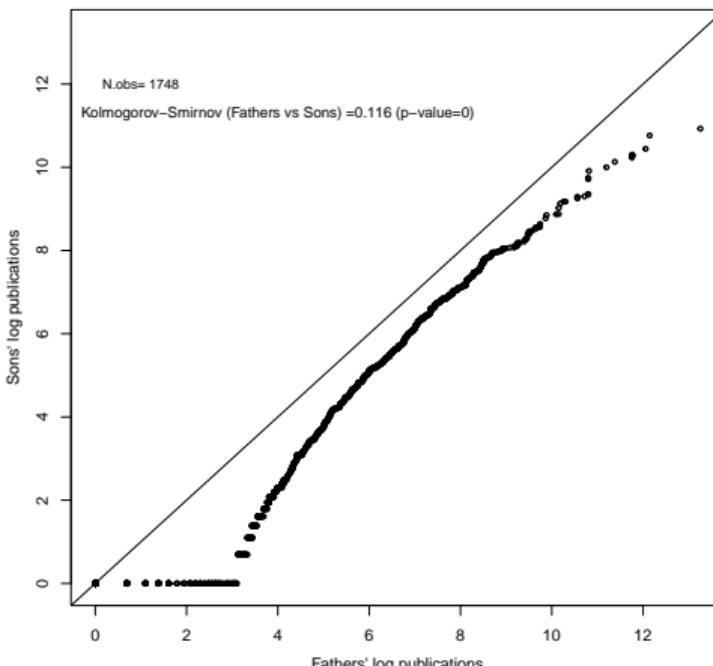
César-François Cassini

Intuitions

Father-son correlation



Parent-child distributional differences



Implications for the true rate of persistence in social status

- Parent-child correlations: high social mobility (Becker-Tomes 1986, ...)
- Multiple-generation estimates: very low social mobility (Clark and Cummins 2014)

These two findings are reconciled by the latent-variable model:

- Latent variable persistent across generations.
- Noisily proxied by observed outcomes (e.g., income, education, occupation).

Two sources of discrepancies between latent variable and observed one

- Measurement error biases downwards parent-child correlations.
- Selection bias through nepotism

This paper: New method to identify the true rate of persistence

Related literature

- Intergenerational persistence:
 - Parent-child: Becker and Tomes (1986), Solon (1999), Mazumder (2005), Corak (2006), Mulder et al. (2009), Black and Devereux (2011), Chetty et al. (2014), Zylberberg (2016), Bordieu et al. (2017).
 - Multiple generations: Guell et al. (2015), Clark (2015), Clark and Cumins (2015), Braun and Stuhler (2018), Collado et al. (2019), Lindhal et al. (2015), Adermon et al. (2018), Long and Ferrie (2018), Colagrossi et al. (2019).
- Top professions: Lentz and Laband (1989,1992), Dunn and Holtz-Eakin (2000), Perez-Gonzalez (2006), Bennedsen et al. (2007), Dal Bo et al. (2009), Durante et al. (2011), Raitano and Vona (2018), Bell et al. (2018), Aina and Nicoletti (2018).
- Upper-tail human capital: Greif (2006), Cantoni and Yuchtman (2014), Mokyr et al. (2002), Mokyr (2016), Squicciarini and Voigtländer (2015), de la Croix, Doepke, Mokyr (2018).

Database

- Database built from catalogues of members of universities and academies.
- Matched with biographical dictionaries.
- Coverage: pre-industrial Europe (< 1800).
- 1,538 and 1,748 sons in 166 institutions.
- Scholar's publications (library holdings in Worldcat).

LUNDS UNIVERSITETS HISTORIA

1668—1868.

V. **Andreas Stobæus** utnämndes 1687 ^{4/11}, till historiarum et poeseos professor, efter att förut hafva med sistnämnda ämne förenat professionen i eloquentia, och innehade lärostolen i ofvannämnda ämnen, sedan 1708 gemensamt med universitetsbibliothecariatet, till sin död 1714 ^{11/12}.

Han var född i Stoby i Skåne 1642. Efter födelseorten hade han antagit namnet Stobæus, som under mera än ett århundrade skulle blifva så nära förenadt med det carolinska universitetets minnen, sedan han först bland de fem professorer af detta namn, som universitetets historia räknar, der gjort

XI. **Nils Stobæus** utnämndes såsom secreterare vid universitetet till eloquentiae et poeseos professor 1735, och innehade detta embete till 1754 ^{7/12}.

Han var född i Lund 1694, en son af den berömde Andreas Stobæus. Efter studier vid universitetet blef han 1714 anställd såsom amanuens vid dess bibliothek. Sedan han under åren 1716—18 hade varit anställd såsom lärare för kosack-hetmannen Philip Orlick's söner, hvilka varit sin fader följacktiga till Sverige, och sedan han dels i Lund, dels i Stockholm vid högtidliga tillfällen



1. Book on history of university
2. read & encode professors
3. match with biographical dictionary (here geni.com)

Professor Nils Stobæus

Also Known As:	"Nicolaus", "Stobæus"
Birthdate:	February 10, 1694
Birthplace:	Lund, Sweden
Death:	December 07, 1754 (60) Lund, Skåne, Sweden
Immediate Family:	Son of Andreas Stobæus and Gjeska Mårtensdotter Höriling Husband of Maria Ingelström Father of Anna Geska Stobæa; Andreas Peter Stobæus; Kilian Stobæus; Christina Elisabet Stobæa; Laurentius Stobæus and 7 others Brother of Elisabet Stobæa and Gjeska Christina Stobæa Half brother of Margareta Cecilia Anna Stobæa and Lorentz Christoffer Stobæe
Occupation:	Professor i Lund

Stobaeus, Andreas 1642-1714

Overview

Works: 53 works in 77 publications in 3 languages and 178 library holdings
Genres: History Poetry Sources Academic theses Criticism, interpretation, etc
Roles: Author, Thesis advisor

Publication Timeline



Alternative Names

Andreas Stobæus dansk-svensk hävdaforskar och latinsk skald

Andreas Stobæus schwedischer Dichter, Rektor und Literaturwissenschaftler

Andreas Stobæus Swedish poet (1642-1714)

Andreas Stobæus Zweeds dichter (1642-1714)

Stobæus, Anders 1642-1714

Stobæus Andreas

Languages

Latin (21)

English (19)

Stobaeus, Nicolaus

Overview

Works: 75 works in 81 publications in 3 languages and 96 library holdings
Genres: History
Roles: Author, Thesis advisor, Contributor, Other, the, pra

Publication Timeline



Alternative Names

Nils Stobæus filoloog

Nils Stobæus svensk universitetslärare

Nils Stobæus Swedish university teacher (1694-1754)

Stabæus, Nicolaus 1694-1754

Stobæus, N. (Nils), 1694-1754

Stobæus, Niclas 1694-1754

Stobæus, Nicol. (Nicolaus), 1694-1754

Stobæus, Nicolaus

Stobæus, Nicolaus 1694-1754

Stobæus, Niklas

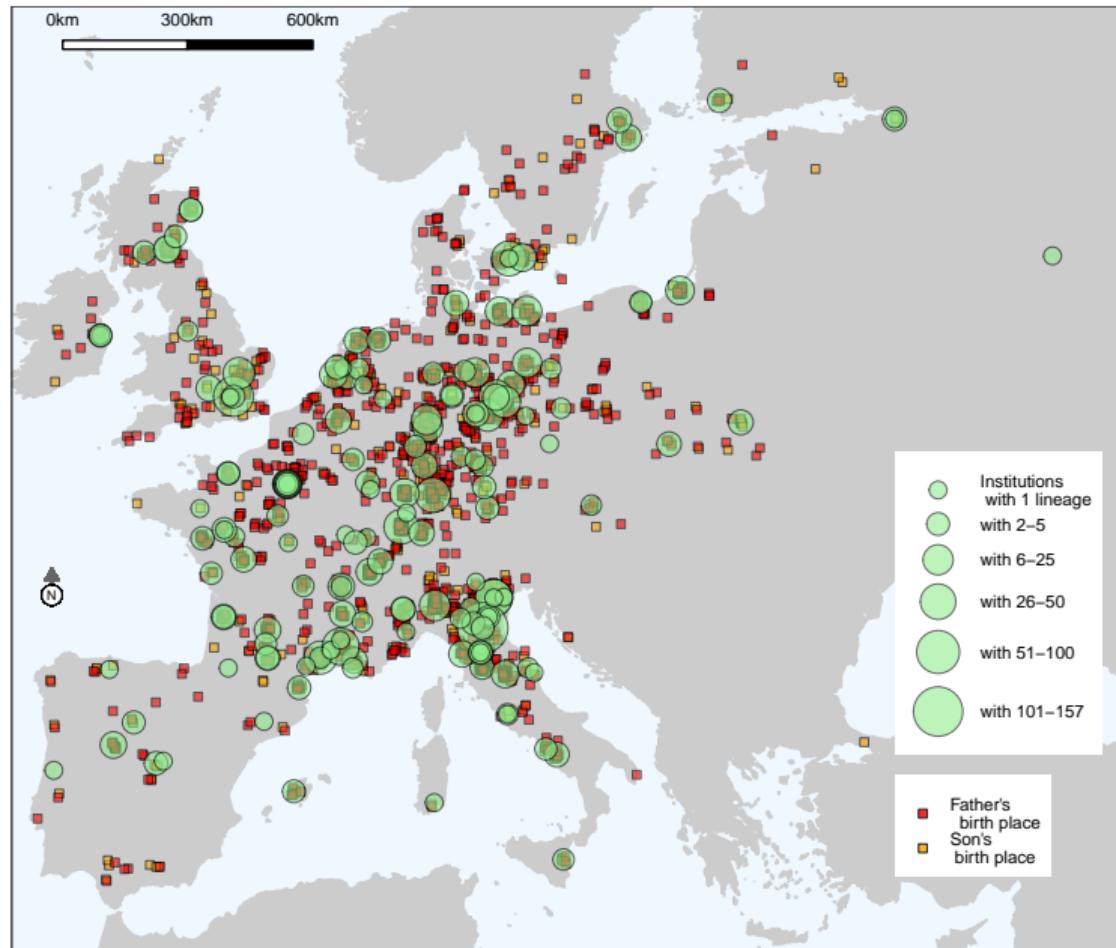
Stobæus, Niklas 1694-1754

Breadth of coverage

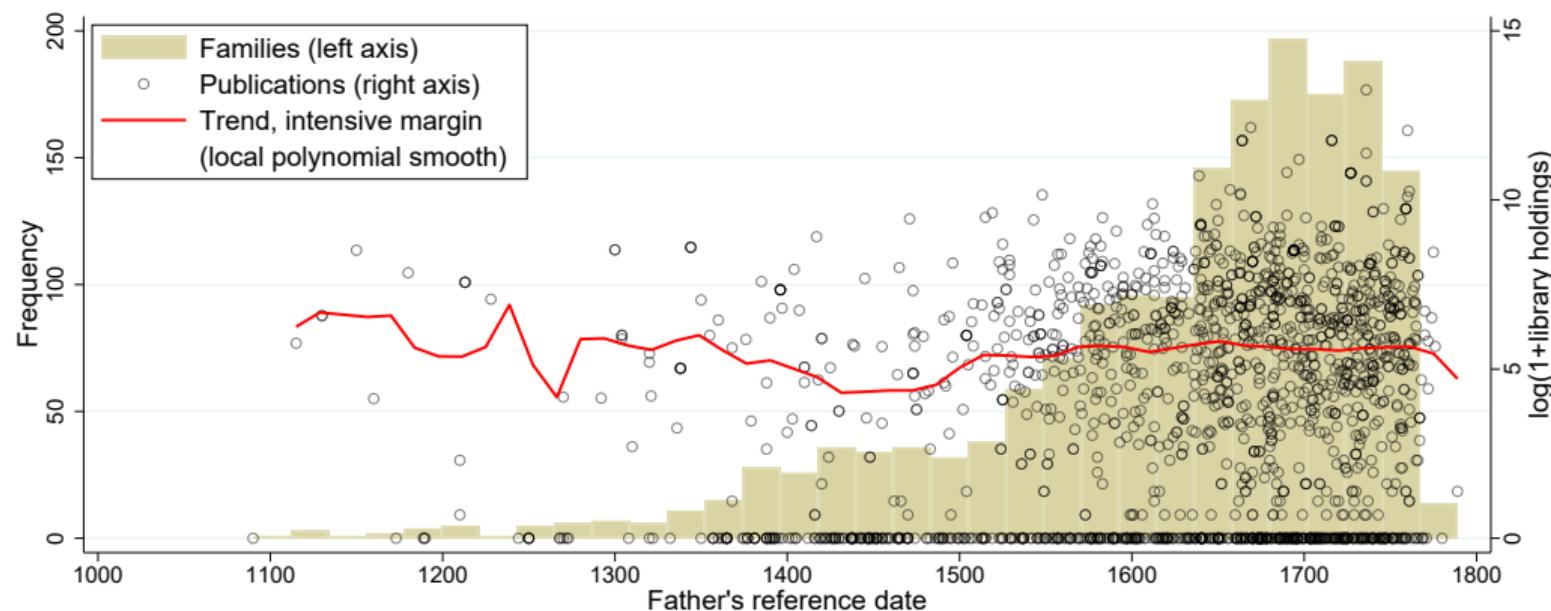
Coverage	Number of institutions	Number of sons
Comprehensive	80	1,134
Broad	56	520
Partial	30	94
Total	166	1,748

Covered institutions: top 10

Institution (dates)	N	Main Sources	Bio. dictionary
Univ. of Bologna (1088-)	171	Mazzetti (1847)	Treccani
Royal Society (1660-)	78	www.royalsociety.org/	Oxford DNB
Accademia dei Ricovrati (1599-)	60	Maggiolo (1983)	Treccani
Uni. of Padova (1222-)	59	Facciolati (1757)	Treccani
Uni. of Avignon (1303-1793)	58	Laval (1889), Fournier (1892) Teule(1887), Duhamel(1895)	Barjavel (1841)
Uni. of Copenhagen (1475-)	47	Slottved (1978)	www.geni.com
Uni. of Tübingen (1476-)	47	Conrad (1960)	Alg. Deu. Bio.
Uni. of Basel (1460-)	45	Herzog(1780)	Attinger(1928)
Leopoldina (1652-)	44	www.leopoldina.org/	Alg. Deu. Bio.
Uni. of Montpellier (1289-1793)	37	Dulieu (1975, 1979, 1983)	Clerc(2006)



Families of scholars overtime



Qualitative evidence

Nepotism

After sixty years of teaching canon law in Salamanca, Juan Alfonso Benavente (-1478) retired in 1463. He retained his chair and his lectures were taught by substitutes, including his son Diego Alfonso de Benavente (c. 1430-1512). Finally, on November 19, 1477, Benavente resigned to his chair on the condition that his son was firmly appointed to it. (source: Diccionario Biográfico Español)

Human capital transmission

Jean Bauhin (1541-1613, professor in Basel) learned very early the ancient languages and humanities. His father, Jean Bauhin (1511-1582, professor of medicine in Basel), was his first master in the study of medicine and of all the underlying sciences. (source: Michaud, biographie universelle, 1811)

Intergenerational transmission of human capital

We start from a standard model of intergenerational transmission

Father's human capital: $h_{t-1} \sim N(\mu_h, \sigma_h^2)$.

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

where β : intergenerational elasticity of human capital.
 u : random ability shock, i.i.d $N(\mu_u, \sigma_u^2)$

Publications and measurement error

Human capital is not observable, but publications are a noisy proxy of it:

Father's publications (in logs): $y_{t-1} = h_{t-1} + \varepsilon$ if $h_{t-1} + \varepsilon > \kappa$, $y_{t-1} = 0$ otherwise

Son's publications (in logs): $y_t = h_t + \epsilon$ if $h_t + \epsilon > \kappa$, $y_t = 0$ otherwise

noises $\varepsilon, \epsilon \sim N(\mu_e, \sigma_e^2)$.

κ : minimum level of publications so that we observe them today.

If one estimates

$$y_t = b y_{t-1} + v_t .$$

$\hat{b} = \beta\theta$ is a biased measure of β , where $\theta = \frac{\sigma_h^2}{\sigma_h^2 + \sigma_\epsilon^2}$

Selection and Nepotism

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: $h_t > \tau - \nu$

The set \mathbb{P} of scholar lineages (father and son are scholars) is:

$$\mathbb{P} = \{i \mid h_{t-1} > \tau, h_t > \tau - \nu\} \subset \mathbb{I}$$

Share of nepotic sons:

$$\gamma = F_h(\tau \mid h_{i,t+1} \geq \tau - \nu)$$

Moments m_j used in the estimation

Sons			Fathers			Both		
Moment	value	s.e.	Moment	value	s.e.	Moment	value	s.e.
$\Pr(y_t = 0)$	0.38	(0.01)	$\Pr(y_{t-1} = 0)$	0.29	(0.01)	$\Pr(y_t = 0 \wedge y_{t-1} = 0)$	0.22	(0.01)
$Q50(y_t)$	2.83	(0.26)	$Q50(y_{t-1})$	4.30	(0.14)	$\text{cor}(y_t, y_{t-1} _{y_t, y_{t-1} > 0})$	0.37	(0.03)
$Q75(y_t)$	5.74	(0.10)	$Q75(y_{t-1})$	6.68	(0.08)	$\text{cor}(y_t, y_{t-2} _{y_t, y_{t-2} > 0})$	0.22	(0.17)
$Q95(y_t)$	7.85	(0.08)	$Q95(y_{t-1})$	8.66	(0.12)			
$E(y_t)$	3.07	(0.07)	$E(y_{t-1})$	3.92	(0.08)			

Estimation (1/2)

Vector of parameters: $p = \{\beta, \mu_h, \sigma_h, \sigma_e, \kappa, \gamma\}$.
(normalize $\tau = 0$, impose stationarity)

Given p , draw many artificial families \rightarrow moments in the model economy: $\hat{m}_j(p)$

Minimize gap between empirical moments m_j ($j = 1, \dots, 13$) and $\hat{m}_j(p)$

$$\min_p V(p) \quad \text{with} \quad V(p) = \sum_j \left(\frac{\hat{m}_j(p) - m_j}{\text{Std.Dev}(m_j)} \right)^2 + \sum_{k=1,6,12} \lambda (\hat{m}_k(p) - m_k)$$

Setting λ large allows to fit perfectly $\Pr(y_t = 0)$, $\Pr(y_{t-1} = 0)$,
 $\text{cor}(y_t, y_{t-1} \mid y_t, y_{t-1} > 0)$.

Results

Parameter		value	s.e.
Intergenerational elasticity of human capital	β	0.632	0.042
Nepotism	γ	0.188	0.017
Std. deviation of shock to publications	σ_e	0.347	0.202
Threshold of observable publications	κ	1.968	0.113
Mean of human capital distribution	μ_h	1.715	0.432
Std. deviation of human capital distribution	σ_h	3.880	0.182

Comparison with other methods

method		value	s.e.	N	
Two-generations, all	\hat{b}	0.472	0.019	1,748	$y_{i,t+1} = b y_{i,t} + e_{i,t+1}$
Two-gener., intensive marg.	\hat{b}_I	0.318	0.028	887	<i>idem</i> , $y_{i,t}, y_{i,t+1} > 0$
Multiple-generations	$\hat{\beta}$	0.874	0.078	210	$\hat{\beta} = b_{G1-G3} / b_{G2-G3}$
Model's β	β	0.632	0.042	1,748	

β vs. \hat{b}_I : human capital is more persistent than what the correlation in publications suggests

β vs. $\hat{\beta}$: neglecting selection/nepotism may lead to overestimate the true intergenerational persistence

Fit

	Model w/o nepotism	Baseline model	Data
Fathers with zero pubs.	0.36	0.29	0.29
Sons with zero pubs.	0.36	0.38	0.38
Median, fathers	4.35	3.38	3.92
Median, sons	4.34	2.97	2.83
Father-son correlation	0.34	0.37	0.37
Father-son with zero pubs.	0.21	0.17	0.22
Gfather-gson correlation	0.21	0.19	0.22

Nepotism matches:

- Higher proportion of zeros for sons.
- Gap in median publications.

Reversal to the mean alone cannot

Results over time

	β	γ (%)	N
Pre-Scientific Revolution, 1088-1543	0.24 (0.14)	46.1 (7.39)	336
Scientific Revolution (I), 1543-1632	0.63 (0.08)	19.9 (3.54)	362
Scientific Revolution (II), 1633-1687	0.60 (0.08)	19.8 (3.13)	411
Enlightenment, 1688-1800	0.65 (0.10)	4.3 (3.43)	636

Nepotism decreases over time. Is the society as a whole becoming more meritocratic?

Introduction
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Data
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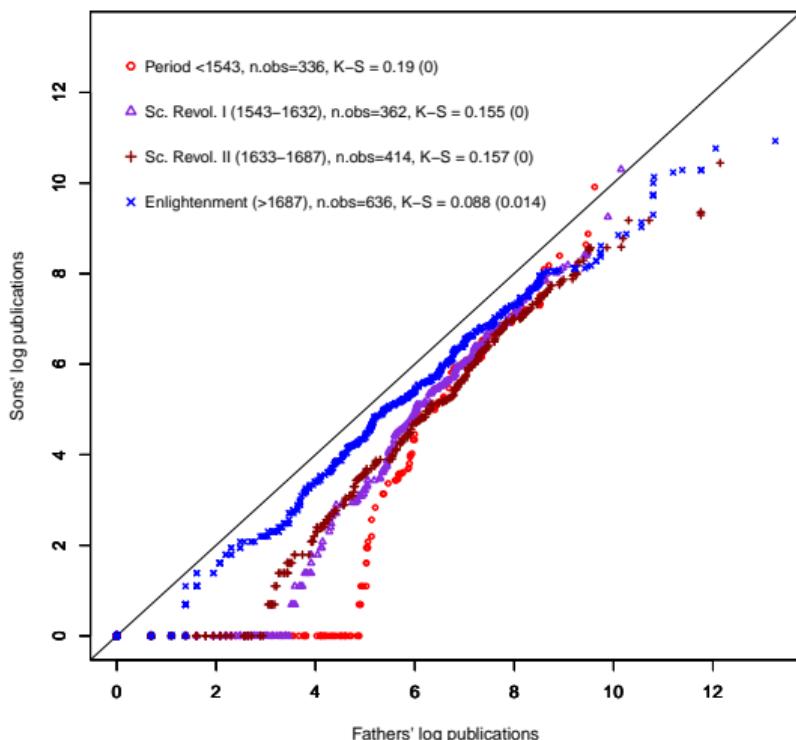
Structural estimation
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Validation
○○

Heterogeneity
○○○

Conclusion
○

Results over time - QQ plot



Results over time: old vs new institution

	β	γ (%)	N
Institution established pre-1543	0.62 (0.06)	18.1 (3.09)	695
Institution established post-1543	0.62 (0.05)	8.9 (2.14)	715

Decreases over time due to the creation of more meritocratic universities.

Validation of mechanism with families at different universities

485 father-son pairs in which sons were appointed to a different institution

		Baseline	\neq universities
Interg. elasticity human capital	β	0.63 (0.04)	0.56 (0.14)
Nepotism	γ	18.8% (1.70)	0.07% (0.06)
S.D. shock to publications	σ_e	0.35 (0.20)	1.20 (0.47)
Threshold observable publications	κ	1.97 (0.11)	3.19 (0.60)
Mean human capital distribution	μ_h	1.72 (0.43)	5.71 (0.33)
S.D. human capital distribution	σ_h	3.88 (0.18)	1.79 (0.24)

Further validation

	β	γ (%)	N
<i>Same vs. different field as father</i>			
Father & son in same field	0.68 (0.05)	21.95 (2.09)	1295
Father & son in diff. fields	0.56 (0.07)	12.20 (3.83)	453
<i>C. Son appointment date</i>			
After father's death	0.54 (0.06)	14.79 (2.95)	704
Before father's death	0.71 (0.06)	19.91 (2.24)	733

Protestant vs. Catholics

	β	γ (%)	N
<i>A. University's religion (after 1527)</i>			
Protestant	0.47 (0.05)	5.27 (1.61)	811
Catholic	0.73 (0.04)	29.49 (2.69)	629

Results by field

	β	γ (%)	N
<i>B. Field of study (of fathers)</i>			
Lawyer	0.70 (0.07)	31.38 (3.83)	436
Physician	0.60 (0.08)	19.77 (3.75)	504
Theologian	0.52 (0.09)	8.00 (2.97)	240
Scientist	0.63 (0.08)	12.17 (3.44)	279

Robustness

Sample selection due to partial coverage

Stationarity of publications

Shocks from fat-tailed distributions.

Measure of publications.

Conclusion

New method to disentangle **nepotism vs. human capital** based on **selection vs. measurement error**.

Dataset on scholars and members of scientific academies in Europe (1100–1800).

Two “latent variables” explaining high persistence of social status:

- 18.8% scholars’ sons are scholars themselves due to nepotism.
- High *true* rate of transmission of human capital, abilities... ($\beta = 0.63$).

Importance for UTHC production:

- Nepotism decreases over time, thanks to the creation of more meritocratic institutions
- Academia became more complementary with development