

MAX-PLANCK-INSTITUT FÜR DEMOGRAFISCHE FORSCHUNG

MAX PLANCK INSTITUTE FOR DEMOGRAPHIC RESEARCH

# The Dynamics of Scholars' Life Expectancy in the Holy Roman Empire

*Robert Stelter*<sup>2</sup>, David de la Croix<sup>1</sup> & Mikko Myrskylä<sup>2</sup>

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- Recent research literature emphasizes the role of upper-tail human capital (Mokyr 2016, Squicciarini & Voigtlaender 2015, Chaney 2017, Kung 2017, Gergaud et al. 2016, Cummins 2017, Cantoni Yuchtman 2014, De la Croix & Licandro 2015, Dittmar & Meisenzahl 2016, Becker et al. 2016)
- Objective: to measure the size of the relevant population and its life expectancy
- The length of life matters as it was essential for both knowledge transmission and enhancement in a world of face-to-face communication.(Lucas 2009)



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 Some (older) evidence that longevity improved in the 17<sup>th</sup> and 18<sup>th</sup> centuries and well before the Industrial Revolution. (Hollingsworth 1977, Vandenbroucke 1985)

#### Longevity of

- ... the scientific elite organized in academies of sciences (Andreev et al. 2011, van de Kaa et al. 2008, Winkler-Dworak 2008)
- ... of artists (van Poppel et al. 2013)
- ... popes and artists (Carrieri et al. 2005, Hanley et al. 2006)
- ... Cardinals of the catholic church (Fornasin et al. 2010)
- ... European nobility over a long period of time (Cummins 2017)
- ... famous people from the Index Bio-bibliographicus Notorum Hominum (de la Croix and Licandro 2015).



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#### What do we plan to contribute to the literature?

We plan to focus on an important sub-population of the elite for knowledge accumulation: members of scientific academies and universities.

- 1. To establish a scholar catalog
- 2. Estimate the dynamics of mortality
- 3. Measure the impact of big shocks on longevity (like the Thirty Years' War)



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# The Holy Roman Empire 1648 and the Netherlands



# Academies and Universities in the scholar catalog



• List



#### Krantz, Albert(us)

Lebensdaten:\* 1448 in Hamburg<br/>† 07.12.1517 in HamburgProf. in Rostock:1481-1486zuletzt:Philosophische Fakultät



## Sources of the Scholar Catalog

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zuletzt: Philosophische Fakultät

**Johann Wilhelm Baier**, **Johann Wilhelm Baier**, **Johann Millelm Baier**, **Johann 11**. November 1647 du Nürnberg, wo fein Bater, John **Baier** Bateritabt, bezog 1664 bie Univerlität Alltorf, wurbe 4667 **Johann 1669 nach Iele Univerlität Alltorf**, wurbe des **Johan 1669 nach Iele Univerlität Magister**, ging 1669 nach Iele Univerlität **Magister**, ging 1669 nach Iele Antone Michof von Stina, weis **Johan 2000 Magister**, ging 1669 nach Iele Antone Michof von Stina, weis **Johan 2000 Magister**, ging 1669 nach Iele Antone Michof von Stina, weis **Johan 2000 Magister**, ging 1669 nach Iele Antone Michof von Stina, weis **Johan 2000 Magister**, ging 1669 nach Iele Antone Michof von Stina, weis **Johan 2000 Magister**, 1692 trug man ihn auf, mit ben Biichof von Stina, weis **Johan 2000 Magister** 1694 wurbe et Stolefor ber The Antone **Johan 2000 Magister** 1694 wurbe et Stolefor ber Stole antone **Magister** 1694 wurbe et Stolefor ber Stole and Antone **Magister** 1694 wurbe et Stolefor ber Stole antone **Magister** 1694 wurbe et Stolefor ber Stole antone **Magister** 1694 wurbe et Stolefor ber Stole antone **Magister** 1695. **Magister** 



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1823

1924

1897

geboren am 11. November 1647 du Nürnberg, wo fein Bater, Joh. Bewarn um 11. november 1021 du nurwery, wo fein zourer, Soy. Bill. B., Raufmann war, befuchte von 1659 an bas Opmaasium frimm Ochmetracht forest the stationartic ortext feiner Baterstadt, bezon ack Oane kieweinen 4679 auf 9900 bezon hee Ragiftet, ging 1669 nach Jena, tout and and and motor Stuggher, 81119 roos nun Seine, vispinier roos nun Stelent sei Serzogs Ernit zu Gotha pro licealia, 1674 murbe er Profession wer Schwarzeite Acco American eine eine mit bem wither an Other mar Theologie. 1682 trug man ihm auf, mit bem Bijchof von Eina, weis An hie Omekettenken mit ben Biltorien eine auf cher die Protestanten mit den Katholiten du vern wigwi wur kunn, wers her die Protestanten mit den Katholiten du vereinigen suchte, eine Uns 1769 Cons. user one provenumen mit ven sturyonnen du verennigen nuger, eine une terrebung zu halten. 1694 wurde er Professor der Speologie in Halle, Abbe Constitueistante eine eine Professor vereinen eine eine 1970 1695 Confistorialrath, Startofarret, Derhofprediger und Generaljus meintembant in Mainen und Charle an 40 Deteter 4000 1784 Corr. 1828 perintendent in Weimar und starb am 19. October 1695. Baier's Schriften find in J. C. Zoumeri vilae professor. etc. Jenae, 1711. Dalet's Sariften und in J. U. Loum eri vilas professor. etc. genze, 1/11. p. 217—225 verzeichnet. Byl. Chr. G. Icher, Mig. Gel., Ref. geind. and in ill acad. Th. 1 S. 713 f. I. A. Strubbergit Series professor, theal out is ill acad. p. 217 - 725 verzeichnet. Bgl. Chr. G. 3&cher, 2019. Gcl. Rer. Reips., 1750. Th. 1 G. 713 f. J. A. Strubbergii Series professor. theol. qui in ill. acad. ienens. etc. p. 34 jenens. etc. p. 34.



Beek, A. van Beek, G. van Beekman, A.A. Beeldemaker, F. Beer, C. de Beerenbroek, A.B. Beets, M.N.

# Sources of the Scholar Catalog



## A Scholar Catalog for the "Holy Roman Empire"



**OBSERVATIONS BY YEAR OF BIRTH IN SELECTED UNIVERSITIES** 





#### Shemifches Sournal

Freunde der Naturlehre , Arznengelahrtheit, Saushaltungsfunft und Manufacturen.

Entworfen von

#### D. Loren; Crell,

ber theoretifchen Argnengelahrtheit, und ber Materia medica ordentlichem öffentlichem Gebrer auf ber Materia lins Carls Universität, SIC Lint Taga Lenty TE Carller Taga Gerfter Theil,

L & M & O, im Verlage ber Meyerfchen Suchhandlung, 1778.





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#### The law of motion:

$$H_{t+1} = H_t + B_t - D_t \tag{1}$$

with

•  $B_t$ : "birth"

 $\equiv$  newly nominated scholars

► *D*<sub>t</sub>: "death"

 $\equiv$  biological death or scholars quit from the sample

# Some insights on knowledge accumulation



Year

# The dynamics of scholars' birth- and death rates





How to measure mortality?

























... and finally the question of period versus cohort perspective.

# Scholars' median age at "birth" and "death"



# Scholars' median age at "birth" and "death"

























# Uncertainty of estimations as a function of E<sub>Age</sub>

**IDEA: To determine the optima value by the upper and Iower 95% confidence interval** 



E conditional to Age

# **Dynamics in mortality – Cohort Life expectancy**



**Birth Cohort** 

# **Dynamics in mortality – Period life expectancy**



Year

# **Dynamics in mortality – Cox-regression-model**

- Life table calculations do not allow to control for the impact of the institutions, but:
  - Different types of institutions
  - Different types of sources
  - Different types of memberships across sources
- Proposed solution: Cox-regression-model

$$m{h}\left(m{Age},eta_{i},\gamma_{i}
ight)=m{h}_{0}\left(m{Age}
ight)\exp^{eta_{i}T+\gamma_{i}X}$$

with:

▶ ...

- ► T: Vector of time dummies
- I: Vector of institution dummies

# **Dynamics in mortality – Cox-regression-model**

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$$h(Age, \beta_i, \gamma_i) = h_0(Age) \exp^{\beta_i T + \gamma_i X}$$
(2)

with:

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- I: Vector of institution dummies

# **Dynamics in mortality –** $\beta$ from Cox-regression-model



Birth cohort



In line with literature, we find evidence that life expectancy increased well before the industrial revolution:

▶ around 3 years in the 18<sup>th</sup> - century

- but no systematic improvements before
- Mortality crises during the Thirty Years' War
  - ► Life expectancy at age 33 dropped by around 4 years
- Supplemented by the reduced "birth rate", growth of the scientific elite was stopped



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# List of universities established before 1800

- 1. University of Heidelberg (1386)
- 2. University of Cologne (1388)
- 3. University of Erfurt (1389)
- 4. University of Würzburg (1402)
- 5. Leipzig University (1409)
- 6. University of Rostock (1419)
- 7. University of Leuven (1425)
- 8. University of Greifswald (1456)
- 9. University of Freiburg (1457)
- 10. University of Ingolstadt (1472)
- 11. University of Trier (1473)
- 12. University of Mainz (1477)
- 13. University of Tübingen (1477)
- 14. University of Wittenberg (1502)
- 15. Brandenburg University in Frankfurt (1506)
- 16. University of Marburg (1527)
- 17. University of Strassburg (1538)
- 18. University of Dillingen (1553)
- 19. University of Jena (1558)
- 20. Catholic University of Eichstätt-Ingolstadt (1564)
- 21. Leiden University (1575)
- 22. University of Helmstedt (1576)
- 23. University of Molsheim (1618)
- 24. Higher school Herborn (1584)
- 25. University of Franeker (1585)
- 26. University of Giessen (1607)
- 27. University of Stadthagen (1610)
- 28. University of Groningen (1614)
- 29. Theological faculty Paderborn (1614)
- 30. University of Rinteln (1621)
- 31. University of Altdorf (1622)
- 32. University of Passau (1622)



- 33. University of Osnabrück (1629)
- 34. University of Amsterdam (1632)
- 35. University of Kassel (1633)
- 36. Utrecht University (1636)
- 37. University of Bamberg (1647)
- 38. University of Harderwijk (1648)
- 39. University of Duisburg (1655)
- 40. University of Nijmegen (1655)
- 41. University of Kiel (1665)
- 42. Martin Luther University of Halle-Wittenberg (1694)
- 43. Fulda Faculty of Theology (1734)
- 44. University of Göttingen (1734)
- 45. Friedrich-Alexander University Erlangen-Nuremberg (1743)
- 46. Braunschweig University of Technology (1745)
- 47. University of Buetzow (1760)
- 48. Freiberg University of Mining and Technology (1765)
- 49. Technical University Berlin (1770)
- 50. University of Münster (1771)
- 51. Clausthal University of Technology (1775)
- 52. University of Bonn (1777)
- 53. Karl's High School (1781)
- Selected Academies of Science
- 61. German Leopoldina Academy of Researchers (1625)
- 62. Berlin Brandenburg Academy of Sciences and Humanities (1700)
- 63. Academy of Sciences and Humanities in Göttingen (1751)
- 64. Academy of the Arts and Sciences Usful to the Public in Erfurt (1754)
- 65. Palatinate Academy of the Sciences (1763)
- 66. Upper-Lusatian Society of Sciences (1779)
- 67. Royal Netherlands Academy of Arts and Sciences (1808)
- 68. Saxonian Academy of Arts and Sciences in Leipzig (1846)
- 69. Heidelberg Academy of Sciences and Humanities (1909)

# Academies and Universities in the scholar catalog



## A Scholar Catalog for the "Holy Roman Empire"



**OBSERVATIONS BY YEAR OF BIRTH IN SELECTED ACADEMIES**