Catholic Censorship and the Demise of Knowledge Production in Early Modern Italy – Online Appendix

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A Additional Data

A.1 European level database

We present here some general elements on the European database upon which this paper is built.

The compilation of the European database of academic scholars and literati started in 2017 and now (in August 2022) contains data on more than 57,378 persons active in 398 universities and academies.

The time frame covers the range 1000-1800, from the first universities to the dawn of the industrial revolution.

The geographical span covers all of Europe, less the parts that were under Byzantine, Arabic, or Ottoman rules. To show the geographical coverage of the database, Figure A.1 displays the place of origin of all identified scholars over the whole period.

We harvested data manually from secondary sources on the history of universities & academies. We used a total of 522 different sources.

Some summary statistics and maps for the whole dataset are provided in De la Croix (2021). Statistics per institution are provided in the collection *Repertorium Eruditorum Totius Europae*.

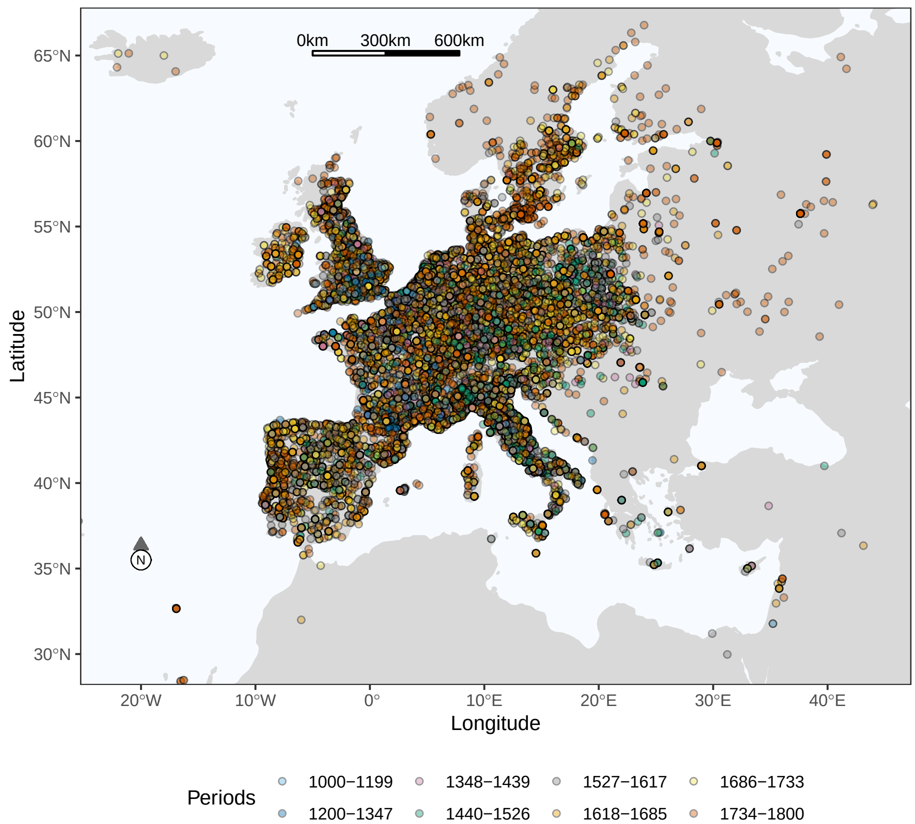

Figure A.1: Coverage of the European database: places of birth of scholars

A.2 Sources for Thomas Dempster

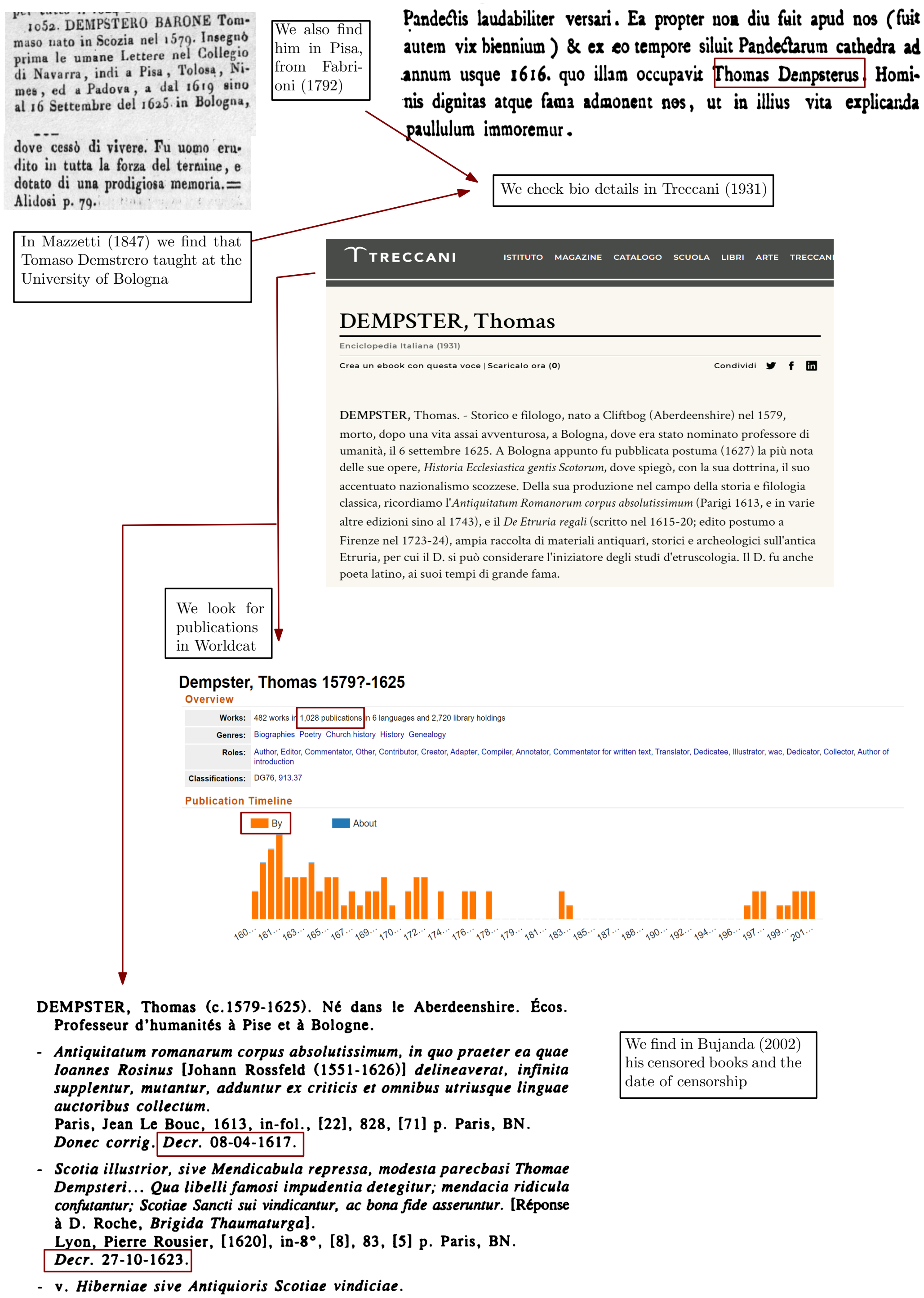

Figure A.2: Data collection: example of Thomas Dempster

A.3 How much of the Italian academic population is covered?

An important question is how much of the Italian University/Academy population is covered.

A) We believe we have a comprehensive coverage for the following universities. For each university we indicate the sources we used.

University of Bologna (1088): Mazzetti (1847). Uncertain foundation date. More details in De la Croix and Vitale (2021).

University of Padua (1222): Pesenti (1984), Casellato and Rea (2002), Facciolati (1757), Del Negro (2015). More details in De la Croix and Vitale (2021).

University of Pisa (1343): Fabroni (1791).

University of Pavia (1361): Raggi (1879), De Caro (1961).

University of Macerata (1540): Serangeli (2010). More details in De la Croix and Spolverini (2021).

University of Roma 'Gregoriana' (1556): Villoslada (1954). More details in De la Croix and Karioun (2021).

Thanks to very detailed secondary sources, we almost have all professors having taught there.

B) We have a broad coverage for the following universities.

University of Modena (1175): Mor and Di Pietro (1975). For Frijhoff (1996), started as a Studium in 1682 only.

University of Naples (1224): Origlia Paolino (1754).

University of Salerno (1231): De Renzi (1857), Sinno (1921). School of medicine active before official foundation date. Unequal coverage over time, continuation of university unclear for some periods.

University of Roma 'Sapienzia' (1303): Renazzi (1803).

University of Perugia (1308): Frova, Catoni, and Renzi (2001), Zucchini (2008), Quaresima (2021). Comprehensive coverage of the medieval period. Broad coverage of the early modern period.

Studium in Florence (1321): Prezziner (1810), Cerracchini (1738). No university status, but important and well documented.

University of Torino (1404): Vallauri (1875). More details in Zanardello (2022).

University of Catania (1444): Sabbadini (1898), Carnazza Amari (1867).

University of Messina (1548): Collective (1900).

University of Mondovi (1560): Vallauri (1875), Grassi (1804).

University of Palermo (1578): Cancila (2006), Sommervogel (1890).

University of Cagliari (1606): Pillosu (2017), Tola (1837).

University of Sassari (1617): Mattone (2010).

University of Mantua (1625): Grendler (2009), Sommervogel (1890).

Thanks to detailed secondary sources, we have a large number of the professors that have taught there, and we probably have all those who published something, which is the relevant dimension for this paper.

C) For the following list, we have only a partial coverage. Many of those universities are quite small, or specialized, or detached from bigger universities (Milano & Venice). Ualtamura-1748, Uancona-1562, Ucamerino-1727, Uferrara-1391, Ugenoa-1773, Ulucca-1369, Umilano-1556, Usiena-1246, Uurbino-1671, Uvenice-1470, Uvicenza-1204.

D) For academies, assessing our coverage is more complicated, as the number of academies is potentially very large. Each city had one or more small academies, sometimes very temporarily, gathering the curious minds of the moment. As we explained in the text, our more important source comes from the data compiled by the British library based on all the books in their possession related in one way or in another to an Italian academy. To this list, we added important academies for which there is complete coverage based on a biographical dictionary of their members: the Bologna Institute, the Crusca, the Ricovrati, and the Gelati.

Accademia Platonica di Firenze (1462): Prezziner (1810).

Accademia Fiorentina (1540): Boutier (2017).

Accademia della Crusca (1583): Parodi (1983).

Accademia dei Gelati (1588): British Library Board (2017), Zani (1672). More details in Rolla and Vitale (2021).

Accademia dei Ricovrati (1599): British Library Board (2017), Maggiolo (1983). More details in Blasutto, De la Croix, and Vitale (2021).

Accademia degli Umoristi (1600): British Library Board (2017).

Accademia Degli Oziosi (1611): British Library Board (2017).

Accademia degli Incogniti (1626): British Library Board (2017).

Scientiarum et artium institutum bonoiense atque academia (1714): Ercolani (1881). More details in Rolla and Zanardello (2022).

and the other smaller academies included in British Library Board (2017).

A.4 How representative are university professors and academicians?

The paper is based on publications by university professors and members of academies. One may wonder how well those publications represent the total production of knowledge in early modern times. To answer that question, one needs to define a new universe of persons from which we can extract the sample of university professors and compute their share. Looking at scientific domains, let us consider the scientists who have given their name to a crater on the moon. Those names were given by the Commission on Lunar Nomenclature of the International Astronomical Union from 1935 onward (Richardson 1945). Among these persons there are 54 Italians born before 1770. Figure A.3 represents their occupation breakdown. A large majority of them were either a university professor, a member of an academy, or both. This supports the idea that our sample of scholars is a good representation of people working in sciences.

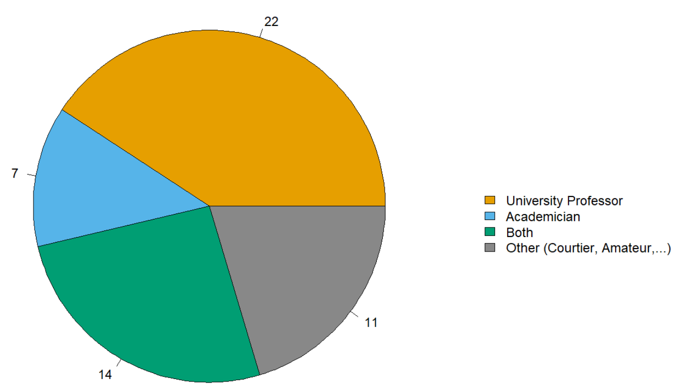

Figure A.3: Occupations of Italians having given their name to a crater on the moon

A.5 Disaggregation of publications by institutions

	Total number of published scholars					Median number of publications per person				
Period	1	2	3	4	5	1	2	3	4	5
Ubologna-1088	56	87	80	57	69	100	117	68	41	14
Unapoli-1224	10	21	26	20	19	150	173	28	43	68
Upadua-1222	76	131	132	76	81	83	82	79	55	23
Upavia-1361	38	72	51	16	8	75	96	52	32	16
Uroma-1303	43	61	61	45	41	462	167	177	72	65
Upisa-1343	12	38	69	58	37	79	84	54	53	19
UromaGregoriana-1556	0	0	65	53	51	0	0	189	84	25
StudFlorence-1321	41	21	13	14	33	170	200	160	337	25
Utorino-1404	14	15	30	3	38	53	107	119	12	17
AcadRicovrati-1599	0	1	71	115	192	0	4	58	72	49
AcadCrusca-1583	0	2	38	107	120	0	594	30	45	85
AcadBologna-1714	0	0	0	0	221	0	0	0	0	76
AcadUmoristi-1600	0	0	30	96	5	0	0	106	52	201
AcadGelati-1588	0	0	21	68	20	0	0	32	67	45
AcadIncogniti-1626	0	0	10	98	0	0	0	225	59	0

Note: periods: 1:1400-69, 2:1470-1539, 3:1540-1609, 4:1610-79, 5:1680-1749

Table A.1: Total number of scholars & publications by period and by Italian institution

A.6 The decline of Italy: robustness to measurement

The first line of Table A.2 compares the median number of *publications by* scholars in Italy and Europe less Italy. Italy is very dominant in the first two periods, before being caught up and overtaken by the rest of Europe. The absolute decline in publications in Italy during periods 3 to 5 is impressive.

An alternative measure could simply be the *number of published scholars per million inhabitants*. With this measure, the initial lead of Italy is even more impressive. Still, Italy ends up being overtaken by period 5.

The next two measures are computed from Worldcat. They deliver the same message as the number of *publications by*. The *number of works* aggregates *publications by* and *publications about* each scholar, but does not count the multiple editions of each work. The number of *library holdings* today can be seen as a measure encompassing both output and recognition of its quality.

Finally, we computed the median *number of characters of the Wikipedia pages* of the published scholars. We consider the longest Wikipedia page among European languages. Some scholars do not have a Wikipedia page, and hence the length for them is zero. There is a negative trend in Europe in the length of Wikipedia pages. For Italy, the median length goes to zero after two periods, reflecting that more than half the published Italian scholars are absent from Wikipedia (nobody wrote a page about them).

	1400-69	1470-1539	1540-1609	1610-79	1680-1749
Median number of publications by					
Rest of Europe	12	47	64	69	61
Italy	72	95	73	40	28
Total number of publishing scholars per million inhab.					
Rest of Europe	4.6	17.5	35.6	48.5	68.8
Italy	27.5	43.5	61.6	64.9	55.2
Median number of works					
Rest of Europe	11	29	40	42	35
Italy	46	62	46	24	19
Median number of library holdings					
Rest of Europe	48	119	144	151	154
Italy	229	204	184	102	74
Median length of Wikipedia page					
Rest of Europe	1395	1462	1087	985	953
Italy	1128	839	0	0	0

Table A.2: The decline of Italy: robustness to measurement

A.7 Correlation between different measures of notoriety

In this section, we use the Italian sample to compute the correlations between the various notoriety measures used in the previous section: number of publications by (Worldcat), i.e. the measure used in the main text; the number of works (Worldcat); the total number of library holdings (Worldcat); the length of the longest Wikipedia page.

We also include three additional measures not used above (because their median is constant at zero or one). The additional measures are: the number of Wikipedia pages in different languages; the number of languages involved in the publications (Worldcat), and the number of publications about (Worldcat). Table A.3 presents the linear correlations (Pearson), while table A.4 shows the rank correlations (Spearman).

	publi_by	nworks	nlib	LengthWiki	NWikiLang	nlang	publi_about
publi_by	1	0.979	0.837	0.394	0.532	0.563	0.677
nworks	0.979	1	0.883	0.423	0.588	0.579	0.757
nlib	0.837	0.883	1	0.385	0.578	0.525	0.952
LengthWiki	0.394	0.423	0.385	1	0.614	0.443	0.383
NWikiLang	0.532	0.588	0.578	0.614	1	0.624	0.583
nlang	0.563	0.579	0.525	0.443	0.624	1	0.482
publi_about	0.677	0.757	0.952	0.383	0.583	0.482	1

Table A.3: Correlations between measures of notoriety (Pearson)

	publi_by	nworks	nlib	LengthWiki	NWikiLang	nlang	publi_about
publi_by	1	0.984	0.965	0.631	0.611	0.795	0.686
nworks	0.984	1	0.954	0.642	0.621	0.794	0.703
nlib	0.965	0.954	1	0.675	0.658	0.816	0.755
LengthWiki	0.631	0.642	0.675	1	0.883	0.620	0.707
NWikiLang	0.611	0.621	0.658	0.883	1	0.610	0.711
nlang	0.795	0.794	0.816	0.620	0.610	1	0.681
publi_about	0.686	0.703	0.755	0.707	0.711	0.681	1

Table A.4: Rank correlations between measures of notoriety (Spearman)

All the notoriety measures are highly correlated with each other, in particular when we use the rank correlation. In the main analysis, we opted for the variable “publi by” because it is the one which is the closest to our theoretical concept of books by an author. If we use other measures, the computed quantiles would be similar.

A.8 How is the distribution of the scholars' fields changing over time?

Europe overtook Italy in terms of scholars' quality. In principle, this could be driven by the fact that a field with low average publications became relatively more common in Italy than in Europe. To answer this question, in Table A.5 we show the dynamics of scholars' quality in Italy and Europe by field.[1] We observe that in each field the quality of scholars is initially lower in Europe than in Italy and that at the time censorship was introduced Italy loses (or starts losing) its advantage. Figure A.4 shows that censorship affects all fields.

	Distribution (%) of the scholars' fields for each period					Median publications per person				
Period	1	2	3	4	5	1	2	3	4	5
					Italy					
Theology	6	6	12	12	12	49	88	73	56	16
Law	39	27	20	13	14	68	81	22	6	15
Humanities	35	41	45	49	37	132	131	97	49	39
Medicine	13	16	13	13	15	58	66	73	65	24
Sciences	7	9	9	12	20	31	63	165	70	44
Others	<1	1	<1	1	2		747	52	16	13
					Europe (excluding Italy)					
Theology	32	22	26	27	19	11	75	98	85	59
Law	24	18	18	14	12	6	23	46	59	72
Humanities	35	44	36	35	35	14	46	63	69	65
Medicine	5	10	12	13	17	29	52	71	52	59
Sciences	4	6	7	11	14	19	120	90	86	76
Others	<1	1	<1	1	3		12	378	125	74

Note: periods: 1:1400-69, 2:1470-1539, 3:1540-1609, 4:1610-79, 5:1680-1749.

Theology: Theology, scriptures

Law: Canon law, Roman law, French law

Humanities: History, Literature, Philosophy, Ethics, Rhetoric, Greek, Poetry

Medicine: Medicine, Anatomy, Surgery, Veterinary, Pharmacy, Botany

Sciences: Mathematics, Logic, Physics, Chemistry, Biology, Astronomy, Geography

Others: Applied Sciences (Engineering, Architecture, Agronomy),Social Sciences

Table A.5: Distribution & publications by period and field

[1] In case the scholar is associated with more than one field, we expand the observation according to the number of her/his fields. Details about each discipline can be found below Table A.5.

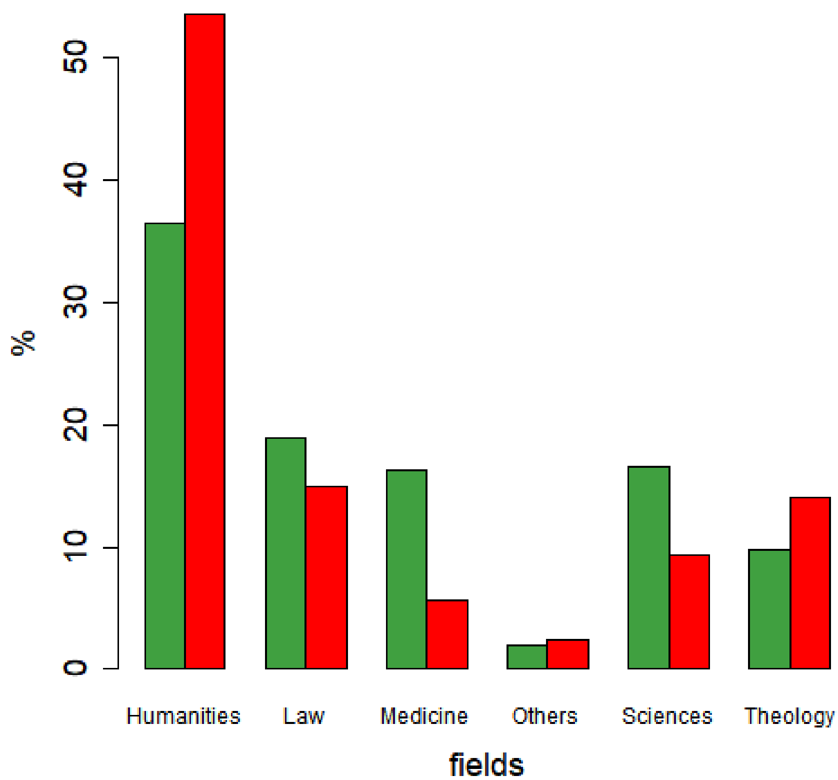

Figure A.4: Distribution of the fields of scholars. Red: censored. Green: non-censored.

A.9 Famous Scholars

Period	Total number of published scholars 1	2	3	4	5	Median number of publications per person 1	2	3	4	5
Europe	84	252	404	455	598	455	811	716	608	651
Italy	41	77	137	115	122	680	828	637	453	594
France	12	49	79	130	178	146.5	1113	988	520	670
Germany & Austria	15	84	82	44	192	141	674.5	590	1341	690
Great Britain & Ireland	3	21	50	119	242	15	607	493	808	564.5
Denmark & Sweden	0	6	10	22	60	0	304	328	440	280
Spain & Portugal	8	27	38	16	19	88.5	588	160.5	259	300
Ubologna-1088	6	20	15	12	8	616.5	531	500	235	131
Unapoli-1224	3	3	2	2	3	548	191	193	496	1538
Upadua-1222	12	23	23	10	9	473.5	662	1105	388	563
Upavia-1361	6	12	3	0	2	562.5	1670.5	656	0	980.5
Uroma-1303	21	12	18	6	7	1500	1287.5	506	656	852
Upisa-1343	0	7	9	9	3	0	758	493	438	245
UromaGregoriana-1556	0	0	9	8	2	0	0	1582	1218	966
StudFlorence-1321	15	7	4	6	4	810	1296	744.5	343.5	357.5
Utorino-1404	1	1	4	0	4	553	935	1872.5	0	529
AcadRicovrati-1599	0	0	9	16	38	0	0	1463	337	589.5
AcadCrusca-1583	0	1	10	26	28	0	1184	644.5	357.5	685
AcadBologna-1714	0	0	0	0	66	0	0	0	0	766
AcadUmoristi-1600	0	0	6	24	0	0	0	2467	859	0
AcadGelati-1588	0	0	4	11	3	0	0	1888	298	194
AcadIncogniti-1626	0	0	4	13	0	0	0	556.5	540	0

Note: periods: 1:1400-69, 2:1470-1539, 3:1540-1609, 4:1610-79, 5:1680-1749

Note: Famous scholars: scholars having a Wikipedia page longer than 5000 characters

Table A.6: Total number of famous scholars & publications by period

A.10 The gap in quality between censored and non-censored authors

Figure A.5 below shows that before censorship was introduced in the second half of the sixteenth century, censored authors were of better quality than non-censored authors, but this gap shrank over time. Dots represent authors, which are ordered by their reference date, by log publications, and by whether or not they were censored. The two solid lines are plotted using the *lowess* smoother.

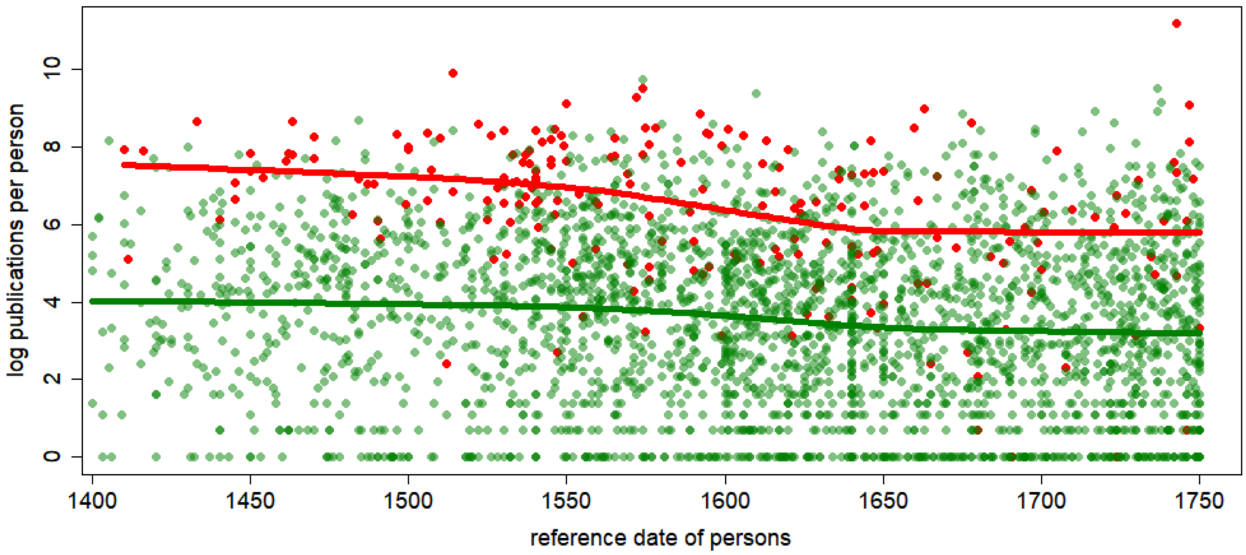

Figure A.5: Log publications of published authors by reference date. Red: censored. Green: non-censored. Solid lines: *lowess* smoother.

A.11 Europe Map

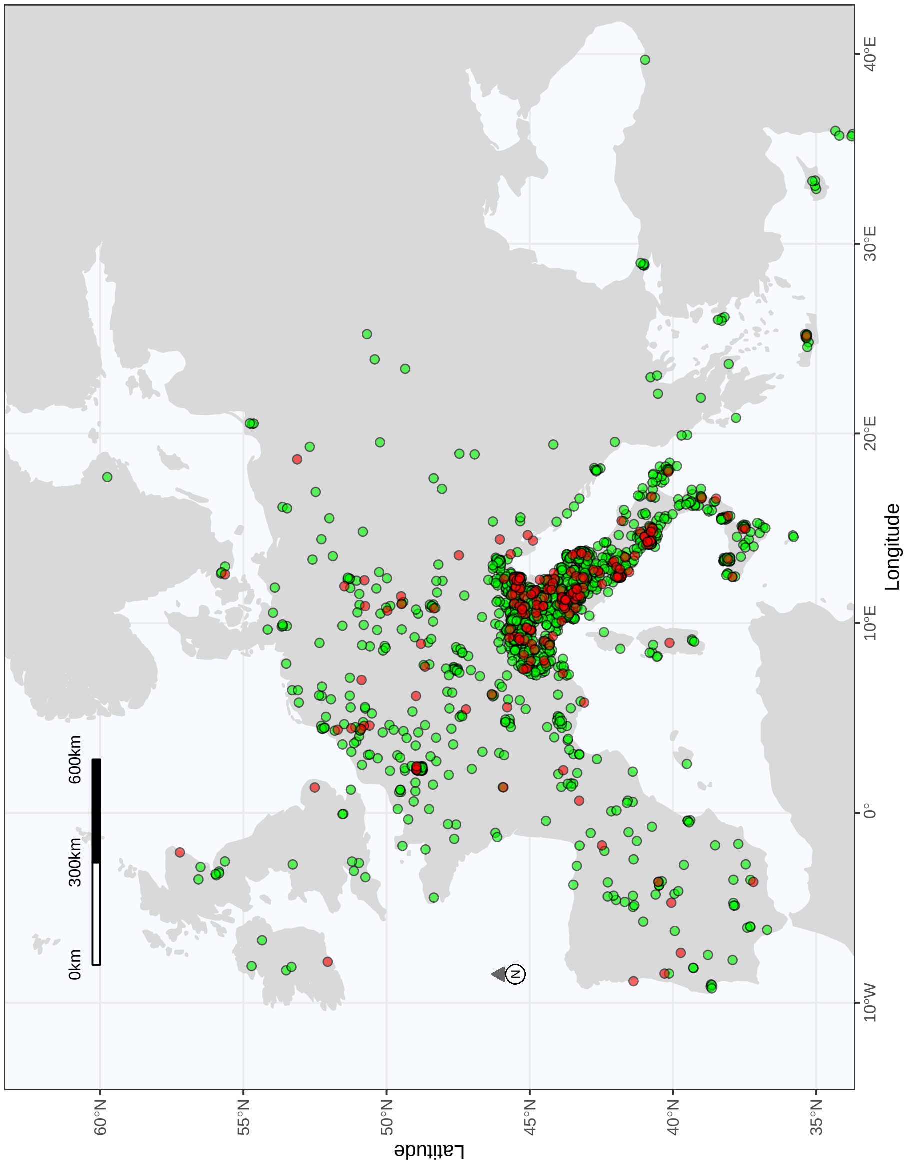

Figure A.6: Place of birth of censored (red) and non censored (green) members of Italian universities & academies – Europe.

B Bibliographies

John Barclay (Pont-à-Mousson 1582 - Roma 1621, censored in 1608) was born to a Scottish-born father. In 1605 John Barclay presented the first part of his *Euphormionis Lusinini Satyricon*. This humanist novel is a very original piece of work (Correard 2017), including a satirical description of the Jesuit schools (he was raised in a Jesuit school). This book was put in the Index on 13 December 1608 (De Bujanda and Richter 2002). At the invitation of the Pope himself, he went to Rome in 1616 and resided there until he died in 1621. Moving to Rome was a way to signal that he was a good Catholic. John Barclay was a member of several Italian academies, including the Accademia degli Umoristi and the Accademia dei Lincei.

Giordano Bruno (Nola 1548 - Roma 1600, censored in 1600) was an Italian friar, a member of the Dominicans. His contributions span from philosophy to mathematics and cosmology. He is best known for being persecuted by the Catholic Church and was later regarded as a martyr for science. The Inquisition found him guilty of heresy for several of his views, among which his positions on cosmology: he theorized an infinite universe and a plurality of worlds. All of his works were entered the Index of forbidden books, and he was burned at stake in Rome's square, the Campo de' Fiori.

Bernardino Ciaffoni (Porto Sant'Elpidio 1615/1620 - Marches 1684, censored in 1701) was a theologian and belonged to the order of the Franciscans. He also used to be a rector of the well-known college San Bonaventura, located in Rome. His *Apologia*, published posthumously, defends the rigorist doctrine and fights the probabilism supported by Jesuits. This piece of work was introduced into the Index because of its 'insulting' claims against Jesuits.

Nicolaus Copernicus (Thorn 1474 - Frauenburg 1543, censored in 1616) was a Prussian mathematician and astronomer. In his book *De revolutionibus orbium coelestium*, he theorized the cosmos as having the Sun at the center of the solar system, where the Earth rotated around it. This theory is a deep contrast to the Ptolemaic model, where the Earth is stationary at the center of the universe. Several other scientists, including Galilei, contributed to his theory by bringing evidence to support it. While his theories were welcomed positively by the Church at first, his *De revolutionibus* was censored in 1616, after that the Church's conservative revolution.

Galileo Galilei (Pisa 1564 - Arcetri 1642, censored in 1634) was an Italian astronomer and physicist. Also Professor in Padova and member of the prestigious Accademia dei Lincei, arguably he was the most notable and influential scientist of his times. He is also known as the father of modern science because of his work on the scientific method. His books were censored because of its support to atomism, heliocentrism, and Copernicanism. The Inquisition condemned him, and he was forced to abjure his thesis and spent the last part of his life under house arrest.

Serry Jacobus Hyacinthus (Toulon 1659 – Padua 1738, censored in 1722) was a theologian and belonged to the order of the Dominicans. Also consultor of the Congregation of the Index, he taught theology at the University of Padua from 1698. His *Historiae*, written under the pseudonym Augustinus Leblanc, deals with the Jesuit-Dominican controversy on grace and was prohibited by the Inquisition.

C Proofs of Propositions

C.1 The Fréchet Cheat Sheet

Since the irrelevance of books of type j is exponentially distributed with scale parameter k_t^j and given Equation (1), the distribution of book quality follows a Fréchet distribution with scale parameter $k^{j\theta}$ and shape parameter $1/\theta$. This allows us to write the average book quality q^j by sector as:

$$E(q_i^j) = \int_0^\infty h_i^{-\theta}(k^j e^{-k^j h_i})\, dh_i \quad \text{with } j \in \{C, R\},$$

Now we can multiply the RHS by $(k^j)^{1+\theta}/(k^j)^{1+\theta}$ to obtain:

$$E(q_i^j) = (k^j)^{1+\theta} \int_0^\infty (k^j h_i)^{-\theta}(e^{-k^j h_i})\, dh_i.$$

Now, using a change of variable $y = k^j h_i$ we have that

$$E(q_i^j) = (k^j)^{1+\theta} \int_0^\infty y^{-\theta} \left(e^{-y}\right) (1/k^j)\, dy.$$

We can finally show that

$$E(q_i^j) = \Gamma(1-\theta)\, (k^j)^\theta \qquad \text{with } \; j \in \{C, R\},$$

where

$$\Gamma(x) = \int_0^\infty s^{x-1} e^{-s} ds$$

is the Euler gamma function.

C.2 The minimum stability postulate

If x and y are mutually independent random variables, exponentially distributed with parameter λ, then $\min(x, y)$ is exponentially distributed with parameter 2λ.

C.3 Occupational Choice

In general, if $X \sim \exp(\lambda_X)$ and $Y \sim \exp(\lambda_Y)$, $\alpha > 0$ is a real number

$$\begin{aligned}
P(\alpha X < Y) &= \int_0^\infty P(X < \frac{Y}{\alpha} \mid Y = y) f_Y(y) dy \\
&= \int_0^\infty \int_0^{\frac{y}{\alpha}} f_X(x) f_Y(y) dx dy \\
&= \int_0^\infty \lambda_Y \exp(-\lambda_Y y) \left(1 - \exp\left(-\lambda_X \frac{y}{\alpha}\right)\right) dy \\
&= \int_0^\infty \lambda_Y \exp(-\lambda_Y y) \, dy \\
&\quad - \left(\frac{\lambda_Y}{\frac{\lambda_X}{\alpha} + \lambda_Y}\right) \int_0^\infty \left(\frac{\lambda_X}{\alpha} + \lambda_Y\right) \exp\left(-\left(\frac{\lambda_X}{\alpha} + \lambda_Y\right) y\right) dy \\
&= 1 - \frac{\lambda_Y}{\frac{\lambda_X}{\alpha} + \lambda_Y} \\
&= \frac{\frac{\lambda_X}{\alpha}}{\frac{\lambda_X}{\alpha} + \lambda_Y} \\
&= \frac{\lambda_X}{\lambda_X + \alpha \lambda_Y}
\end{aligned} \tag{C.1}$$

Since $\tilde{h}_s^C \sim \exp(b_{t+1}^C)$, $\tilde{h}_s^R \sim \exp(b_{t+1}^R)$, and $\hat{p} > 0$, from Equation (C.1) it follows that

$$\text{Prob}\{\tilde{h}_s^C > p^{-1/\theta} \tilde{h}_s^R\} = \frac{b_{t+1}^R}{b_{t+1}^R + b_{t+1}^C p^{-1/\theta}}$$

C.4 Proof of Proposition 1

Using the variable z_t, Equation (12) can be rewritten as

$$z_{t+1} = \frac{1-\beta}{\hat{p}} (z_t)^2.$$

This recurrence Equation admits an explicit solution:

$$z_t = \frac{\hat{p}}{1-\beta} \left(\frac{z_1(1-\beta)}{\hat{p}}\right)^{2^{t-1}}. \tag{C.2}$$

Equation (11) implies that once we know the dynamics of z_t, we also know the dynamics of m_t. Given this change of variable, we use Equation (C.2) to study the limit of z_t and obtain

a) $z_1 < \hat{p}/(1-\beta) \Rightarrow \lim_{t\to\infty} z_t = 0$. Note also that $m_1 < 1/(2-\beta) \Leftrightarrow z_1 < \hat{p}/(1-\beta)$.

b) $z_1 > \hat{p}/(1-\beta) \implies \lim_{t\to\infty} m_t = 1$. Note also that $m_1 < 1/(2-\beta) \Leftrightarrow z_1 < \hat{p}/(1-\beta)$.

c) $z_1 = \hat{p}/(1-\beta) \implies z_t = \hat{p}/(1-\beta)\forall t$. Note $m_t = 1/(2-\beta)\forall t \Leftrightarrow z_t = \hat{p}/(1-\beta)\forall t$

From *a)* and Equation (11), *i)* follows. From *b)* and Equation (11), *ii)* follows. From *c)* and Equation Equation (11), *iii)* follows.

Note that we excluded $m_1 = 1$ from the proposition. In that case, no compliant books are left in the economy and imposing $\beta = 1$ would shut down the whole production of knowledge.

C.5 The Dynamics when the Church's Behavior follows a Rule of Thumb

In Section 3 we described the dynamics under a constant rate of censorship $\beta_t = \beta$. Here we endogenize the introduction of censorship by assuming that the Church chooses the lowest censorship rate that allows to converge to a world with no revolutionary ideas. This is equivalent to assume that the Church has lexicographic preferences, caring firstly to have $\lim_{t\to\infty} m_t = 0$, and secondly to minimize β_t. Given our assumptions, we can describe the dynamics of the share of revolutionary ideas in Proposition 1.

Proposition 1 *For a given share of revolutionary ideas $m_t \in [0,1)$, the Church will choose a level of censorship β_t such that $\beta_t = \max\{2 - 1/m_t + \epsilon, 0\}$, where ϵ is arbitrarily small.*

Proof. Notice that Proposition 1 states that $\lim_{t\to\infty} m_t = 0$ when $m_t < 1/(2-\beta_t)$, from which it trivially follows that $\beta_t = \max\{2 - 1/m_t + \epsilon, 0\}$. ■

Note that for any initial $m_1 \in [0,1)$, we will have $\lim_{t\to\infty} m_t = 0$, but the convergence will be slow due to the fact that in any period m_t would be set very close to the unstable steady state $1/(2-\beta_t)$. It is worth noting that Proposition 1 implies that the Church will impose no censorship if $m_t < 1/2$.

D Optimizing Church's Behavior

We define the value function of the Church recursively. In the case that the Church had not yet established a censorship structure, the value function is

$$V(m_t) = \max[V^N(m_t), V^C(m_t) - \psi],$$

where V^N is the value of not imposing censorship and equals

$$V^N(m_t) = u(1-m_t) + \delta V(m_{t+1})$$
$$\text{s.t.} \quad m_{t+1} = f(m_t; 0) = \frac{m_t^2}{1 - m_t(-2m_t + 2)},$$

while $\delta < 1$ is the discount factor and V^C is the value of having a censorship apparatus set up and equals

$$V^C(m_t) = \max_{0 \leq \beta_t \leq \overline{\beta}} u(1-m_t) + \delta V^C(m_{t+1}),$$
$$\text{s.t.} \quad m_{t+1} = f(m_t; \beta_t) = \frac{(1-\beta)m_t^2}{1 - m_t((\beta - 2)m_t + 2)}.$$

We can write the last value function in this way since $V^N(m_t)$ equals $V^C(m_t)$ if $\beta = 0$ is chosen. Moreover, it is straightforward to see that, once ψ has been paid, the Church will always set β_t to its maximum level.[2] In this model, the Church has to choose between paying a fixed cost today for enjoying a lower share of revolutionary books in the future and postponing such payment. Postponing censorship would be less costly because of discounting, but it would also imply a higher share of revolutionary books in the future. This trade-off implies that the Church would be more prone to implement censorship immediately when the fixed cost ψ is low and when the effectiveness of censorship $\overline{\beta}$ is high. Moreover, the Church is less likely to start censoring the more impatient it is. When $\delta = 0$, the Church cares only about what happens in 0, and therefore it will never pay a cost ψ that affects only the future share of revolutionary books. The Church's decision to start censoring also depends on the initial level of revolutionary books m_1. In fact, m_1 influences the dynamics with and without censorship. To understand why the initial condition matters, consider the extreme case $m_1 = 0$. Proposition 1 states that in this case, m stays constant over time, regardless of the value of $\overline{\beta}$, which makes censorship useless. Proposition 2 allow us to understand better when it is not optimal for the Church to censor:

Proposition 2 *If $\psi > 0$, then there exist $\tilde{m} > 0$ and $1 > \breve{m} > 0$ such that*

i) If $m_1 < \min(1/2, \tilde{m})$ then $\beta_t = 0$ for each $t \geq 1$ (No need to censor),

ii) If $m_1 > \max(1/2, \breve{m})$ then $\beta_t = 0$ for each $t \geq 1$ (Too late to censor).

Proof. Note that imposing censorship when $m = 0$ is not convenient:

$$\frac{u(0)}{1-\delta} = V^N(0) > V^C(0) - \psi = \frac{u(0)}{1-\delta} - \psi.$$

[2]This holds because $\partial f(m_t; \beta_t)/\partial \beta_t \leq 0$ and $\partial u(1-m_t)/\partial m_t < 0$, which implies $\partial V^C(m_t)/\partial \beta_t \geq 0$.

Note also that imposing censorship when $m = 1$ is not convenient.

$$\frac{u(1)}{1-\delta} = V^N(1) > V^C(1) - \psi = \frac{u(1)}{1-\delta} - \psi.$$

Note also that $V^M(m)$ and $V^C(m)$ are continuous functions in $m \in [0,1]$: see Norets (2010) for a formal proof of continuity of discrete choice dynamic value functions under a set of assumptions that are satisfied in our case.

Then, it follows that there exists $\tilde{m}$ and $\breve{m}$, respectively in a neighborhood of 0 and 1, such that for each $m \in [0, \tilde{m}]$ and also for each $m \in [\breve{m}, 1]$, $V^N(m) > V^C(m) - \psi$ holds. According to proposition 1, if censorship is not imposed, $\tilde{m}$ converges to 0, while $\breve{m}$ will converge to 1. Since censorship does not happen for each $m \in [0, \tilde{m}]$ and for each $m \in [\breve{m}, 1]$, proposition 2 is proved. ■

Proposition 2 makes the point that for some m_1 it can be optimal for the Church to never impose censorship, which can be for opposite reasons. In fact, for a low enough m_1, the Church knows that revolutionary ideas would naturally disappear. Therefore, there is no need to censor. Symmetrically, when m_1 is large enough, the Church knows that even imposing censorship, the economy would converge fast to the revolutionary steady state. In this case, it is too late to censor. Proposition 3 improves further our understanding of the Church's censoring behavior.

Proposition 3 *There exists $\overline{\psi}$ such that for each $\psi < \overline{\psi}$, there also exists $\overline{m}, \hat{m}$ such that for $\hat{m} > m_1 > \overline{m}$, $\beta_1 = \overline{\beta}$ holds (window of censorship).*

Proof. We take $\overline{\psi}$ such that for some m^* we have $V^C(m^*) - \overline{\psi} > V^N(m^*)$, then for each $\psi < \overline{\psi}$ it holds $V^C(m^*) - \psi > V^N(m^*)$. Now define $\mathcal{D}(m) = V^C(m) - \psi - V^N(m)$: since this function is continuous, for an arbitrarily small ϵ we have that $\mathcal{D}(m^* - \epsilon) > 0$ and $\mathcal{D}(m^* + \epsilon) > 0$. Using again continuity we can claim that $\mathcal{D}(m) > 0$ for each $m \in [m^* - \epsilon, m^* + \epsilon]$, which implies that the Church will immediately impose censorship if m_1 belongs to this set. ■

Proposition 3 makes the point that, if it is optimal to start imposing censorship at m_1, it is also optimal to censor for m close enough to m_1. This is because the net gains of imposing censorship at m_1 and m are similar.

Note that we could not characterize a closed form of the equilibrium time path $\{m_t\}_{t \geq 1}$. The model leaves open the possibility that revolutionary ideas were growing or declining before the Church implemented censorship. In order to be consistent with the historical fact that the Protestant Reformation started before the first issue of the Index, one would like to find in the estimated model that revolutionary ideas were growing before censorship.

E Discussion of Model Assumptions

Our model of censorship introduction under an optimizing Church's behavior relies on a set of assumptions to make it tractable. In this subsection, we discuss our assumptions, and we compare them with some alternative modeling choices.

One shot fixed-cost of censorship The one-shot nature of the cost ψ helps to rationalize why the Church kept updating the Index until the 20^{th} century. The Church would have removed censorship much sooner if it had to pay ψ each period. In fact, once censorship can shift dynamics towards the compliant steady state, the gains of censorship decrease rapidly.

Maximal level of censorship A point that is worth discussing is why the Church is bounded above by $\overline{\beta}$ in the level of censorship that it can impose. We assume this for three main reasons.

First, the maximum rate of censorship $\overline{\beta} < 1$ depends on feasibility but also on political economy considerations. Italy was not a unified state, but was divided into multiple states with their own objectives and relationships with the Church/Papal States. In the presence of a more or less unified market for books, the Church, to be effective in its censorship, had to avoid making too unhappy any of the Italian states, which could have otherwise decided to play the role of heresy-spreader by protecting local authors and publishers from persecution. This placed a constraint on the Church ability to censor.

Second, the process leading to censorship was largely bottom-up and grounded on external denounce.[3] If the arrival rate (frictions) of new books to be checked is low enough, then the Church can not have the opportunity to censor all revolutionary books. This mechanism explains why many books were censored decades after being first published. It also hints at why some books might have never been censored. Further, it justifies our assumption that the Church censor a *share* and not a *number* of censored authors.

Third, dissimulation to avoid censorship was far from uncommon (Spruit 2019). Heretic authors could cloak their dissident beliefs either by pretending to comply with the Church (*simulatio*) or by hiding their heterodox views to authorities (*dissimulatio*). Decartes' quote "Like an actor wearing a mask, I come forward, masked, on the stage of the world," means that he was conscious of the risks ahead of him and found in dissimulation a valuable tool to overcome them (Snyder 2012). Since books' revolutionary content was seldom hidden, it is reasonable to think that the Church could identify only a share of the heretic books.

[3]By external denunciations, we mean that the Congregation of the Index did not initiate the process most of the time. Wolf (2006) enumerates members of the clergy, aristocracy, and bourgeoisie as the categories of people who were bringing suspicious books to Rome to denounce them.

Censorship enforcement We assumed that the Roman Church was able to enforce the application of the Index outside the Papal State at a constant rate over time. While Putnam (1906) notes that the Church found some difficulties in enforcing censorship in Italy outside the Papal State, recent estimates by Becker, Pino, and Vidal-Robert (2021) suggest high to very high rates of enforcement of the Pauline Index in the Italian peninsula. Appendix F.3 presents a sensitivity analysis where we relax our assumptions about the Church's ability to enforce censorship over time and space. The robustness checks results, summarized in Table F.7, indicate that our assumptions are not crucial for our baseline results.

F Additional details on simulation results

F.1 Technical details of estimation method

The objective function $\Omega(\vartheta)$ to minimize is given by

$$\Omega(\vartheta) = (\mathbf{m} - \mathbf{m}_\vartheta)'\mathbf{W}(\mathbf{m} - \mathbf{m}_\vartheta), \tag{F.1}$$

where ϑ is the vector of parameters, $\mathbf{m}$ is the vector of data moments, and $\mathbf{m}_\vartheta$ is the vector of moments obtained simulating the model with parameters ϑ. $\mathbf{W}$ is a diagonal matrix with $1/\mathbf{m}^2$ as elements. The objective function is minimized using the genetic algorithm package in R developed by Scrucca et al. (2013), which allows for global optimization.

We computed bootstrapped standard errors of the parameters by drawing 500 random samples with replacement from the original data. For each bootstrap sample, we computed the 14 moments and estimated the corresponding parameters. We then used these boot-strapped estimates to compute the standard errors.

The model's simulation is straightforward since there is no uncertainty, and the dynamics are backward-looking. Note that we run simulations assuming that censorship starts in $t = 3$. The timing of censorship depends on the fixed cost of censorship ψ, the estimation of which is discussed in Appendix F.2 below.

In Figure 4, upper panels, the confidence intervals of moments are computed drawing 500 random samples with replacement and then using the 2.5^{th} and 97.5^{th} percentile from the distribution of the variable of interest.

F.2 Details on the calibration of ψ

Parameter ψ is the fixed cost to set up the censorship apparatus. This parameter only influences the timing of censorship: conditional on censorship starting in a defined year, it has no impact on knowledge dynamics. We set it to such that censorship starts in $t = 3$ as in the data. This parameter is *set identified*: there is a range of values that can rationalize the timing of censorship. The bounds of ψ, namely ψ_L and ψ_R, are set as follows. The lower bound ψ_L is the limit value of ψ for which starting censorship in $t = 3$ gives a larger utility for the Church than starting it in $t = 2$. The higher bound ψ_R is the limit value of ψ for which starting censorship in $t = 3$ gives a larger utility for the Church than waiting and starting it in $t = 4$.[4]

[4] Starting censorship in previous periods (2,1,0,-1..) would have given the Church a lower utility than waiting for $t = 3$.

Note that we set ψ assuming a linear time utility function $u(1-m)$. If we chose a different shape that respects the assumptions about $u()$, the value of ψ would have changed, but the timing of censorship and the dynamics would have stayed the same. Note that in Table 4 we report a scaled value of the fixed cost, defined as $\hat{\psi} = \psi/[V^C(1/(2-\overline{\beta})) - V^N(1/(2-\overline{\beta}))]$. Using the methodology explained above, we find $\hat{\psi} \in [1.0310, 1.0339]$.

F.3 Robustness

We now consider the robustness of the simulation results to using alternative samples and/or different theoretical assumptions. The results are reported in Table F.7.

Imperfect censorship. In the model, we assumed that no one could access the knowledge embodied in forbidden books. This sensibility check consists of assuming that the Church was able to enforce censorship only in χ% of total cases. Hence, even if $m_t\overline{\beta}$ authors have been censored, only $m_t\overline{\beta}\chi$ are not available to the next generation. One important question is how to set the value of χ. Our strategy is to calibrate χ such that it matches the causal estimates of censorship enforcement in Becker, Pino, and Vidal-Robert (2021) (BPV). BPV employ a difference-in-differences strategy to study the effect of being indexed on getting printed. Table 1 of BPV reports the effect of the 1559 Roman Index on books printed in the Italian Peninsula.[5] We consider the intermediate estimate of censorship enforcement in Table 1 of BPV (row six, column two), according to which the probability of getting printed goes down by 0.005 after the Index is introduced.[6] Since the probability of being printed was 0.006 before the introduction of the index, we set $\chi = 0.005/0.006 = 83.3\%$. The results reported in Table F.7 indicate that imperfect censorship has only an effect on the baseline results, but this is relatively small. In particular, the impact of censorship on knowledge growth stays large and negative.

Self-censorship. History tells us that censoring books was not the only tactic the Church used to limit the spread of revolutionary books. In fact, in the second half of the 16[th] century, the Catholic Church developed a system of tribunals, called the *Roman Inquisition*, aimed at persecuting both authors and printers accused of heresy. This institution affected the work of scientists and thinkers. One notable example is the experience of Galileo Galilei, who was tried by the Inquisition in 1633. The Inquisition matters for our analysis because it can slow down the accumulation of revolutionary knowledge through self-censorship: even if one author writes a high-quality revolutionary book, she still might prefer not to submit it to the printer for fear of being processed by the Inquisition. Others might have migrated elsewhere in Europe,

[5] They consider books printed in cities within 500km from Rome. This includes all the Italian peninsula except for the extreme northwest and the south of Sicily.

[6] Their outcome is a dummy variable $p_{a,i,t}$ that takes the value 1 if any books by author a are printed in city i in decade t.

where the Church could not reach them.[7] Similarly, even if the best books are revolutionary, printers might still prefer to be compliant for the same reason. This mechanism can be easily incorporated in our framework, assuming that the Inquisition makes publishing and writing revolutionary books less desirable. Individuals take this into account discounting q^R by a factor $\gamma \in [0, 1]$. We can also interpret γ as the probability that authors decide not to write revolutionary books or that printers do not publish them for fear of being punished. Under this new mechanism, the probability that a printer chooses the revolutionary sector is:

$$\text{Prob}\{q^C < \gamma p q^R\} = \text{Prob}\{\tilde{h}^C > (\gamma p)^{-1/\theta} \tilde{h}^R\} = m_t. \tag{F.2}$$

We re-estimate the model enriched by this feature. Parameter γ is mostly identify by $\overline{\beta} m_2$, which is too low in the simulations when the baseline model is used. Note that self-censorship is introduced starting $t = 3$, which allows us to separately identify γ and p. Parameter γ helps to speed the demise of revolutionary ideas, thus allowing for an initial larger level of revolutionary ideas. The estimation implies that γ=0.977 and $\overline{\beta}$=0.17, which is very close to the baseline. Then, we assess the role of direct censorship by comparing simulations with the estimated $\overline{\beta}$ and setting $\overline{\beta} = 0$, where γ is always set to its estimated value. If the baseline model was misspecified, the version with self censorship should give a different effect of direct censorship on knowledge growth. This is not the case: Table F.7 shows that the results differ only slightly from the baseline. To understand the joint role of direct and self censorship, we perform a counterfactual simulation where $\overline{\beta} = 0$ and $\gamma = 1$. The joint effect implies that knowledge quality would have been 59% higher than in the baseline. Since the effect of direct censorship was 37%, this means that self-censorship also has an effect on knowledge quality, even if including it in the model does not alter the baseline results about the effects of direct censorship.

Ten periods model In the baseline model estimation, we consider five periods that last 70 years each. In this sensitivity check, we consider ten periods that correspond to 1400-1434, 1435-1469, 1470-1504, 1505-1539, 1540-1574, 1575-1609, 1610-1644, 1645-1679, 1680-1714, 1715-1749. To make the 5 periods (5P) and the 10 periods (10P) models comparable, the frequency at which authors can access new knowledge should be similar. We do this by assuming that the stock of knowledge available to authors in t is made both by books written in $t-1$ and $t-2$. Specifically, we assume that in t a share ϕ of the books available to authors was written in $t-1$ and a share $1-\phi$ in $t-2$. In the baseline model, $\phi = 1$. In this sensitivity check, we calibrate ϕ such that, using the parameter estimates of the baseline 5P model, the share of revolutionary authors in the 5P model at $t = 5$ equals the average share of revolutionary authors in the last

[7] De la Croix et al. (2020) show that a European academic market existed in early modern times.

two periods of the 10P model. This makes the potential speed of reallocation across compliant and revolutionary sectors in the two models comparable. After having set $\phi = 7.8\%$ following the procedure we just described, we re-estimate the model. Like in the baseline, the target moments are based on the distribution of quality and the share of censored authors, but they are computed according to the model periods of this robustness. Table F.7 shows that the results of this sensitivity check differ only slightly with respect to baseline results.

Time-varying rate of censorship In the baseline estimation we consider a model where the rate of censorship $\overline{\beta}$ stays constant over time. This sensitivity check consists of estimating the model again, allowing the rate of censorship to be different in each period. The results of this alternative estimation strategy are that the rate of censorship is fairly constant over time: the rate of censorship is 20% in $t = 2$, 17% in $t = 3$, 18% in $t = 4$ and 17% in $t = 5$. Censorship reduced log publication by 35% in the time varying model and by 35% in the baseline model.

Only Italian born scholars. Some scholars might have spent only a period of their time in Italy. Living outside Italy could have allowed them to access forbidden books without consequences. To limit this problem, we estimate the model using a sample of Italian born scholars only. Table F.7 shows that the results of this sensitivity check differ only slightly with respect to baseline results.

Only Southern/Northern Italian born scholars. The model used for the baseline estimation assumes that the rate of censorship that the Church can enforce does not depend on scholars' location in Italy. This assumption is problematic if the actual rate of censorship differed drastically across Italian regions. To understand whether this is the case, we estimate the model separately for Italian scholars born in northern and southern Italy. A scholar is defined as northern Italian if he is born in a city whose latitude is larger than 43.8, which corresponds to cities north of Florence. The results reported in Table F.7 indicate that the effect of censorship on knowledge growth is for northern and southern Italian scholars. The effect is slightly stronger for southern Italians because the rate of censorship there is slightly higher. This result is consistent with the Church having a stronger capacity in the Papal state.

Only $t \leq 4$. In the baseline model, we assume that the Church could enforce censorship until 1750, the end of period $t = 5$. In this sensitivity check, we re-estimate the model assuming that the Church can enforce censorship until the end of $t = 4$ only, or 1680. In the last period $t = 5$, the Church keeps censoring authors, but anyone can read revolutionary books. The Church's ability to enforce censorship likely decreased over time. It is also likely that its ability to censor did not disappear completely. Hence, we think that this robustness provides a lower bound to the effect of censorship on knowledge growth. Despite the conservative assumption, the results in Table F.7 show that the effect of censorship is still large, even though slightly lower than in the baseline case. This is because once the decline of revolutionary ideas started, its decline became unstoppable because of inertia.

No weak links. In our baseline sample, we included scholars who have a weak link to a university or academy. These include foreign and corresponding members of academies. One example is Leonhard Euler at Accademia Ricovrati. While all of these scholars decided to do some work with the institution, they might not have been there physically. Scholars with weak links might be less constrained by the Church's censorship, for example, because they lived elsewhere in Europe. Hence, we propose a sensitivity check where we exclude them from the sample and then re-estimate the model. Table F.7 reports the results, which differ only slightly from the baseline estimation. One reason why excluding weak links has a slight effect on the results is that they represent less than 2% of the original sample.

All publications. In the baseline sample, we measure the author's quality by the number of publications written *by* them. It is possible to argue that quality is better measured if publications *about* the author are also included. These capture the impact that these authors had on future generations. Table F.7 reports the results where quality is measured by considering publication both *by* and *about* the author. The role of knowledge accumulation is very similar to the baseline, which indicates that results are robust to different quality measures.

Length of Wikipedia pages. One problem with our measure of authors' quality is that it may be biased because older works have more editions. To limit this problem, we consider a different measure of author quality, based on the number of characters of the author's longest Wikipedia page. Table F.7 shows that our results are robust to this different measure of quality. Note that for building this measure of author quality we followed De la Croix et al. (2020) by assuming that having no Wikipedia page is similar to having one page with a length of 60 characters.

Universities only In the baseline estimation we consider both university professors and members of academies. In Appendix A.3 we show that while the coverage of university professors is very good, we probably miss many members of academies. Hence, we provide a robustness check where we exclude those scholars who were not professors. Table F.7 shows that the result of the baseline and this alternative estimation: censorship reduced log publications by 35% in the first case and 24% in the second case. This result reflects the larger share of censored authors among members of the academies.

Symbol	The role of censorship in: scholars' quality $(q_5 - \hat{q}_5)/q_5$	% heretic scholars $(m_5 - \hat{m}_5)/m_5$	Rate of censorship $\overline{\beta}$	% heretic scholars m_5
Benchmark	-35%	-141%	19%	23%
Imperfect censorship	-24%	-119%	19%	22%
Self censorship	-37%	-123%	17%	25%
Ten periods model*	-37%	-147%	18%	24%
Time-varying censorship rate	-35%	-118%	18%**	26%
Only Italian born scholars	-35%	-111%	17%	28%
Only Southern Ital. scholars	-49%	-97%	18%	35%
Only Northern Ital. scholars	-25%	-119%	16%	23%
Only $t \leq 4$	-22%	-132%	19%	21%
No weak links to institution	-37%	-115%	17%	27%
All publications	-33%	-145%	19%	23%
Length Wikipedia page	-49%	-113%	17%	27%
Universities only	-24%	-116%	16%	23%

Notes: variables denoted by the hat relate to simulations under a no-censorship scenario, while all the other variables relate to simulations with censorship. Subscript 5 corresponds to the period 1680–1749. Symbol * means that the variables of interest are built averaging their value in periods 9 and 10 (not 5). Symbol ** denotes the average rate of censorship over periods 2-5.

Table F.7: Robustness analysis

G British data

Table G.8 shows the equivalent of Table 2 for Great Britain.

Moment description	Period				
	1400-69	1470-1539	1540-1609	1610-79	1680-1749
Number of published scholars (all)	20	65	175	368	851
Log publications per scholar (all), median (1)	1.78	3.89	4.81	5.3	4.99
Log publications per scholar (all), 75^{th} percentile	3.55	6.21	6.09	6.49	6.12

Table G.8: Moments per period

Table G.9 shows the equivalent of Table 6 for Great Britain. The annual GDP per capita series underlying the values of μ_t are from Broadberry et al. (2015).

t	years	μ_t (GDP per capita)
1	1400-1469	1.000
2	1470-1539	1.019
3	1540-1609	1.014
4	1610-1679	1.035
5	1680-1749	1.473

Table G.9: Different processes for μ_t

H The Supply side effect of Longevity

Is longevity an important factor in the number of publications of scholars? If this is the case, the drop in longevity we observe in Italy in the sixteenth century may have added another effect on knowledge accumulation, through the supply side of books.

To quantify this channel we adjust the scholars' distributional moments for the variation in longevity at the macroeconomic level. We do this in two steps. First, we calculate the marginal effect of living one additional year on the mean, median, 75th, and 95th percentile of the log publications. Second, we adjust the baseline distributional moments by adding the marginal effects above times the deviation of aggregate longevity from its reference level. In other words, we calculate what the scholars' distributional moments would have looked like if Italy did not experience the drop in longevity described in the main text.

Formally, we first estimate the following equation by OLS:

$$y_{i,t} = \alpha + \delta(mean) \cdot L_{i,t} + e_{0\ i,t} \ , \tag{H.1}$$

where i indicates scholars; $y_{i,t}$, is the logarithm of one plus the number of publications; and $L_{i,t}$ is the scholar's longevity in years. Hence, $\delta(mean)$ captures the marginal effect of one additional year of life on the log publications. Estimating $\delta(mean)$ by OLS allows to understand this relationship for the *average* scholar. Note that, by construction, the sample is restricted to all European scholars in academia with known birth and death years.

Next, we run a quantile regression to estimate the relationship between longevity and publications at other distributional moments than the mean. Formally, we estimate:

$$Q_{y_{i,t}}(q|L_{i,t}) = \alpha_i + \delta(q) \cdot L_{i,t} \ , \tag{H.2}$$

where q is the quantile of interest; $\delta(Q50)$ and $\delta(Q75)$ are the marginal effect of living one additional year on the median and 75th percentile of the sons' publication distribution.

Table H.10 presents the corresponding estimates. Column [1] confirms that longevity is important for publications. One additional year of life is associated with an increase of 0.0177 log publications on average. Columns [2] to [3] show that one additional year of life is associated with an increase of 0.019 log-publications both at the median and 75th percentile.

	[1]	[2]	[3]
	OLS	Quantile Regression	
	$\delta(mean)$	$\delta(Q50)$	$\delta(Q75)$
Longevity (years)	0.0177***	0.0190***	0.0190***
	(0.00093)	(0.00112)	(0.00108)
Observations	27,192	27,192	27,192
Country fixed effects	yes	yes	yes

Note: The sample is scholars with known birth and death year;$^{***}p<.01$,$^{**}p<.05$,$^{*}p<.1$

Table H.10: The effect of Longevity on son's distributional moments

We now correct the distributional moments based on these estimated marginal effects. Table H.11 presents the following summary statistics broken down by period: the number of scholars in the sample, the number of scholars for whom longevity is known, the mean age at death, and the change in the mean age at death compared to the first period, which is used as a reference point.

Period	Number of scholars	Scholars with vital dates	Scholars' longevity L	Δ longevity L
1400-1469	210	163	68.25	
1470-1539	397	291	63.85	-4.4
1540-1609	760	572	65.19	-3.06
1610-1679	756	553	64.80	-3.45
1680-1749	778	612	69.99	1.74

Table H.11: Scholars' mean age at death (longevity)

Table H.12 presents the distributional moments. The second column shows the baseline median of log publications per period. The third column is its corrected value, which is computed by adding $0.019 \times \Delta L$ to the respective value in the second column. The fourth column reports the implied percentage change in log publications. Finally, the last three columns repeat the same correction for the 75th percentile. We conclude that the drop in longevity experienced by Italy over the period 1470-1680 led scholars to publish less, reducing the median log publications by 2% at most.

	Median log publications			75th pctl log publications		
Period	Baseline	Corrected	Change	Baseline	Corrected	Change
1400-1469	4.27	4.27	0.0%	5.73	5.73	0.0%
1470-1539	4.56	4.48	-1.8%	5.98	5.90	-1.4%
1540-1609	4.29	4.23	-1.4%	5.57	5.51	-1.0%
1610-1679	3.69	3.62	-1.8%	5.05	4.98	-1.3%
1680-1749	3.33	3.36	1.0%	5.16	5.19	0.6%

Table H.12: Adjusting publications to offset longevity changes

References

Becker, Sascha, Francisco J. Pino, and Jordi Vidal-Robert. 2021. "Freedom of the Press? Catholic Censorship during the Counter-Reformation." CEPR Working Paper 16092.

Blasutto, Fabio, David De la Croix, and Mara Vitale. 2021. "Scholars and Literati at the Academy of the Ricovrati (1599–1800)." *Repertorium Eruditorum totius Europae* 3:51–63.

Boutier, Jean. 2017. "Accademia Fiorentina - liste des membres." Excel spreadsheet.

British Library Board. 2017. Database of Italian Academies. `https://www.bl.uk/catalogues/ItalianAcademies/`.

Broadberry, Stephen, Bruce MS Campbell, Alexander Klein, Mark Overton, and Bas Van Leeuwen. 2015. *British economic growth, 1270–1870*. Cambridge University Press.

Cancila, Orazio. 2006. *Storia dell'Università di Palermo dalle origini al 1860*. Laterza.

Carnazza Amari, Giuseppe. 1867. *Sul diritto che ha l'archiginnasio di Catania di essere riconosciuto università di prima classe 1867*. Catania: Stabilimento Tipografico Caronda.

Casellato, Sandra, and Luciana Sitran Rea. 2002. *Professori e scienziati a Padova nel Settecento*. Padua: Antilia.

Cerracchini, Luca Giuseppe. 1738. *Fasti teologali ovvero notizie istoriche del collegio de'teologi della... universita fiorentina dalla sua fondazione sino all'anno 1738 (etc.)*. Francesco Moücke.

Collective. 1900. *CCCL anniversario della Università di Messina*. Messina: Trimarchi.

Correard, Nicolas. 2017. "De l'onirisme à l'ironie : les prestiges de la nuit dans l'Euphormion de Jean Barclay (1605)." *Études Épistémè*, vol. 30.

De la Croix, David. 2021. "Scholars and Literati in European Academia before 1800." *Repertorium Eruditorum Totius Europae* 5:35–41.

De la Croix, David, and Soraya Karioun. 2021. "Scholars and Literati at the Gregorian University in Rome (1551–1773)." *Repertorium Eruditorum totius Europae* 3:19–26.

De la Croix, David, and Gaia Spolverini. 2021. "Scholars and Literati at the University of Macerata (1540–1800)." *Repertorium Eruditorum totius Europae* 2:39–45.

De la Croix, David, and Mara Vitale. 2021. "Scholars and Literati at the University of Bologna (1088–1800)." *Repertorium Eruditorum totius Europae* 1:1–10.

De la Croix, David, and Mara Vitale. 2021. "Scholars and Literati at the University of Padua (1222–1800)." *Repertorium Eruditorum totius Europae* 3:33–42.

De Bujanda, Jésus Martínez, and Marcella Richter. 2002. *Index des livres interdits: Index Librorum Prohibitorum 1600-1966*. Volume 11. Montréal: Médiaspaul.

De Caro, Luigi. 1961. *Discipline e maestri dell'Ateneo Pavese: Nel Sesto Centenario dello Studium Generale Pavese (1361-1961)*. Universítá di Pavia.

De la Croix, David, Frédéric Docquier, Alice Fabre, and Robert Stelter. 2020. "The Academic Market and the Rise of Universities in Medieval and Early Modern Europe (1000-1800)." CEPR Discussion Paper No. DP14509.

Del Negro, Piero. 2015. *Clariores: dizionario biografico dei docenti e degli studenti dell'Università di Padova*. Padova University Press.

De Renzi, Salvatore. 1857. *Storia documentata della Scuola medica di Salerno*. Nobile.

Ercolani, Giovanni Battista. 1881. *Accademia delle scienze dello Istituto di Bologna dalla sua origine a tutto il MDCCCLXXX*. N. Zanichelli.

Fabroni, Angelo. 1791. *Historiae academiae pisanae*. Bologna: Forni.

Facciolati, Jacopo. 1757. *Fasti Gymnasii Patavini*. Padua: typis Seminarii.

Frijhoff, Willem. 1996. "Patterns." Chapter 2 of *A History of the University in Europe. Vol. II: Universities in Early Modern Europe (1500–1800)*, edited by Hilde de Ridder-Symoens. Cambridge University Press.

Frova, Carla, Giuliano Catoni, and Paolo Renzi. 2001. "Maestri e scolari a Siena e Perugia 1250-1500." `http://www3.unisi.it/docentes/index.html`.

Grassi, Gioachino. 1804. *Dell'Università degli studi in Mondovì*. Mondoví: Gianandrea Rossi.

Grendler, Paul F. 2009. *The University of Mantua, the Gonzaga, and the Jesuits, 1584–1630*. Baltimore: John Hopkins University Press.

Maggiolo, Attilio. 1983. *I soci dell'accademia patavina dalla sua fondazione (1599)*. Padua: Accademia Patavia di Scienze Lettere ed Arti.

Mattone, Antonello. 2010. *Storia dell'Università di Sassari*. Ilisso.

Mazzetti, Serafino. 1847. *Repertorio di tutti i Professori antichi e moderni della famosa Università, e del celebre Istituto delle Scienze di Bologna*. Bologna: tipografia di San Tommaso d'Aquino.

Mor, Carlo Guido, and Pericle Di Pietro. 1975. *Storia dell'università di Modena*. LS Olschki.

Norets, Andriy. 2010. "Continuity and differentiability of expected value functions in dynamic discrete choice models." *Quantitative economics* 1 (2): 305–322.

Origlia Paolino, Giovanni Giuseppe. 1754. *Istoria dello studio di Napoli*. Torino: nella stamperia di Giovanni di Simone.

Parodi, Severina. 1983. *Catalogo degli Accademici dalla Fondazione.* Firenze: Presso l'Accademia.

Pesenti, Tiziana. 1984. *Professori e promotori di medicina nello studio di Padova dal 1405 al 1509.* Trieste: Lint.

Pillosu, Francesco. 2017. "Libro de grados de Doctores començando del ano 1709 asta 1723." Universita di Cagliari.

Prezziner, Giovanni. 1810. *Storia del publico studio e delle società scientifiche e letterarie di Firenze.* Firenze: Carli.

Putnam, George Haven. 1906. *The Censorship of the Church of Rome and Its Influence Upon the Production and Distribution of Literature: 1600-1900.* Putnam's sons.

Quaresima, Giulio. 2021. "Onomasticon. Prosopografia dell'Università degli Studi di Perugia." `https://onomasticon.unipg.it/onomasticon/home.do`.

Raggi, A. 1879. Memorie e documenti per la storia dell'Universita di Pavia e degli uomini piu illustri che vi insegnarono.

Renazzi, Filippo Maria. 1803. *Storia dell'Università degli studi di Roma: detta comunemente la sapienza, che contiene anche un saggio storico della letteratura romana, dal principio del secolo XIII sino al declinare del secolo XVIII.* Stamperia Pagliarini.

Richardson, RS. 1945. "Who's Who in the Moon." *Leaflet of the Astronomical Society of the Pacific* 4:346.

Rolla, Cecilia, and Mara Vitale. 2021. "Scholars and Literati at the Academy of the Gelati (1588–1799)." *Repertorium eruditorum totius Europae* 5:1–7.

Rolla, Cecilia, and Chiara Zanardello. 2022. "Scholars and Literati at the Academy of Sciences of Bologna (1714–1800)." *Repertorium Eruditorum totius Europae* 7:57–65.

Sabbadini, Remigio. 1898. *Storia documentata della Regia Università di Catania.* Catania: Stabilimento Tipografico C. Galàtola.

Scrucca, Luca, et al. 2013. "GA: a package for genetic algorithms in R." *Journal of Statistical Software* 53 (4): 1–37.

Serangeli, Sandro. 2010. *I docenti dell'antica Università di Macerata:(1540-1824).* G. Giappichelli.

Sinno, Andrea. 1921. *Diplomi di laurea dell'Almo Collegio salernitano.* Salerno: Stabilimento Tipografico Spadafora.

Snyder, Jon R. 2012. *Dissimulation and the culture of secrecy in early modern Europe.* Univ of California Press.

Sommervogel, Carlos. 1890. *Bibliothèque de la Compagnie de Jésus*. Brussels: Oscar Schepens.

Spruit, Leen. 2019. Pages 1–6 in *Censorship, Self-Censorship, and Dissimulation*, edited by Dana Jalobeanu and Charles T. Wolfe. Cham: Springer International Publishing.

Tola, Pasquale. 1837. *Dizionario biografico degli nomini illustri di Sardegna*. Chirio.

Vallauri, Tommaso. 1875. *Storia delle università degli studi del Piemonte*. Stamperia reale di GB Paravia.

Villoslada, Ricardo García. 1954. *Storia del Collegio Romano dal suo inizio (1551) alla soppressione della Compagnia di Gesù (1773)*. Gregorian Biblical BookShop.

Wolf, Hubert. 2006. *Storia dell'Indice: il Vaticano ei libri proibiti*. Donzelli.

Zanardello, Chiara. 2022. "Scholars and Literati at the University of Turin (1404–1800)." *Repertorium Eruditorum totius Europae* 7:31–38.

Zani, Valerio. 1672. *Memorie imprese, e ritratti de'Signori Accademici Gelati di Bologna*. Per li Manolessi.

Zucchini, Stefania. 2008. *Universita e dottori nell'economia del Comune di Perugia: i registri dei Conservatori della moneta (secoli 14.-15.)*. Deputazione di storia patria per l'Umbria.