Online Appendix to Lifespans of the European Elite, 800-1800

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Title(URL)	N	Nfam
British Isles. Heraldic Baronage	14,799	7,752
British Isles. Peerage, Baronetage, and Landed Gentry families.	225,220	107,851
England. Bedfordshire Visitation, 1566, 1582, 1634	7,081	3,263
England. Essex Visitation	15,331	7,475
England. Gloucestershire Visitation	9,754	4,548
England. Leicester. Long Clawson Parish	20,739	6,395
England. London. Residents of London	296,738	93,972
England. London. Visitation of London 1633-1635	16,581	7,481
England. London. Visitation of London, 1664	4,686	2,131
England. Norfolk. 1563 Visitation of Norfolk	23,098	9,457
England. Surrey. Visitation of Surrey	9,340	4,290
England. Sussex. Genealogies of Families Living In Sussex	20,508	7,880
England. Yorkshire. Filey Community Tree	1,816	456
England. Yorkshire. Visitation of Yorkshire. 1563-1564	16,735	7,785
Europe: Royal and Noble Houses of Europe	332,511	149,763
Ireland, County Down, Newry area	73,932	14,909
Ireland. Early Irish Families	4,295	2,294
Wales. Welsh Medieval Database Primarily of Nobility and Gentry	267,857	134,653

Table 1: Summary of Data Sources

A Collecting the Raw Data

The source data for this analysis was 'scraped' (a process involving an automated computer program designed to extract text from the web) from familysearch.org between the 15th December 2013 and the 28th February 2014, using imacrosweb automation software. Table 1 details the 17 family trees used here. The data are presented online via an individual and family index, along with individual pages (detailing birth, death, source and other information) and family pages (detailing marriage and child information). As the data was collected in this way it was essential to conduct tests on the data extraction.

Firstly, all index data had to be checked for completeness. This was done by checking by eye the first and last sequence number (as reported in the index) for each family tree (both individual and family) and also ensuring that there were no gaps in the extracted sequence numbers. This was checked manually for each of the 17 trees and the data was appended with missing sequence entries until the manual check declared that all information had been extracted. Table 2[1] details this numbers involved in this process.

Once the index data was extracted, each individual and family web page was extracted.

[1] Unique values of the individual index are less that the sequence number as many duplicates (because an individual entry for each recorded marriage and child-producing "union" for each individual) are reported in the individual index.

Tree ID	Tree Code	Family Index			Individual Index		
		N	Seq_{Max}	Unique	N	Seq_{Max}	Unique
1	PagetHeraldicBaronag	7,752	7,752	7,752	16,434	16,434	14,799
2	Nixon	107,884	107,884	107,884	242,259	242,259	225,085
3	BedfordVisitation	3,263	3,263	3,263	7,359	7,359	7,081
4	EssexVisitation	7,475	7,475	7,475	16,002	16,002	15,331
5	GloucesterVisitation	4,548	4,548	4,548	10,117	10,117	9,754
6	LongClawson	6,394	6,394	6,394	20,775	20,775	20,738
7	London	93,972	93,972	93,972	308,800	308,800	296,734
8	LondonVisitation1633	7,481	7,481	7,481	16,914	16,914	16,581
9	LondonVisitation1664	2,131	2,131	2,131	4,917	4,917	4,686
10	Norfolk	9,457	9,457	9,457	24,153	24,153	23,098
11	Surrey1530-1572-1623	4,290	4,290	4,290	9,654	9,654	9,340
12	SussexGenealogies	7,880	7,880	7,880	21,684	21,684	20,462
13	YorkshireVisitation	7,785	7,785	7,785	17,268	17,268	16,735
14	EuropeRoyalNobleHous	152,819	152,819	152,819	369,948	369,948	339,785
15	NewryIreland	14,902	14,902	14,902	73,849	73,849	73,818
16	IrishFamilies	2,965	2,965	2,965	5,609	5,609	5,423
17	Welsh	134844	134,844	134,844	280,856	280,856	268,387

Table 2: Scrape Check

Again, the index and extracted data were compared to ensure completeness (by tabulating the individual PIDs (person IDs) and FIDs (family IDs). Following duplicate removal, the complete sample size was 1,329,466.

B Encoding 'Fuzzy' Dates to Decimal Values

The family tree records contain 402,204 unique date descriptions. Dates could be described as "about" or as events, primarily "b." (born), "d." (died), "c." (christened) and "bur." (buried). The types of dates reported varied from exact days to a range over a set of years. Table 3 details the composition of the dates in terms of the broad 'types' along with a date quality code, from 1 (best) to 4 (worst).

Many data decisions had to be made. Firstly, 'after' and 'before' type dates were excluded from analysis."Double dates", a peculiar compromise between the Julian and Gregorian calendars, were assigned the later mentioned year. For example, a date recorded as January 10th 1710/11 is a 'double date' because the year would be 1710 in the Julian calendar and 1711 in the Gregorian calendar. (The year began on March 25th in the Julian calendar and January 1st in the Gregorian calendar.) All dates have been treated in the Gregorian convention and where a double date is recorded, the later year is assigned. Further, all dates (full dates and month-year dates) earlier than April before Pope Gregory XIII's papal bull of the 1582 are assigned the Gregorian year (which is the reported year+1).

$Date_Q code$	Date Type	N Unique
1	Exact dy-mth-yr	324,626
2	Exact mth-yr	10,436
3	Exact yr	12,608
2	"About" dy-mth-yr	3,088
3	"About" mth-yr	590
4	"About" yr	4,817
2	Range $<$ 1 month	1,203
3	Range $<$ 1 year	152
4	Range $>$ 1 year, $<$ 5 years	4,191
	Before/After	35,472
	Unknown/Null	5,036

Table 3: Types of Dates Reported

17,388 dates were adjusted in this way. Hollingsworth (1957, p.5) deals with many of the same issues.

Where the date is given as a range of days or months within a calendar year, the mid-point is taken as the effective date. Where the range is one month, the later month is taken. For ranges over a year, all above or equal to five were assigned to unknown. For the rest the mid-point year was selected. Dates expressed as a range of days are treated as "full exact dates", with the assigned day being the mid-point day between the two day ranges.

B.1 Christenings and burials

As the birth-christening interval was likely to vary across Europe and time, it was decided to take a simple approach. Noble parents typically had the means and the motivation to baptize their children quickly[2]. For 181 rare cases an exact christening and birth date are reported. In 156 cases (86%) the difference between these dates is under 1 year. The median difference was 9 days. Where a christening date is reported instead of a birth date, I have applied a correction of 9 days.

Where no death date is reported but a burial date is reported an adjustment of 10 days (0.025 of a year) is made. This is a conservative estimate based upon expected delays between a nobles death and his or her burial. Often, lavish funeral arrangements had to be made (especially for an unforeseen death), funeral attendees would have to travel and the

[2]Amongst the nobility, it may have been common to baptize the newly born at home (at least in 17th century Naples, Astarita (2013, p.249)). The delay between birth and christening may be taken as an indicator of religiosity, especially in climates of high infant mortality (Boswell (1998, p.95)). The birth of a prince may have necessitated a more lavish christening than usual. Arthur, Prince of Wales, was born 20th September 1486. His christening was 4 days later at Winchester Cathedral.

practice of dividing the noble cadaver into pieces for separate burials in different places, would lengthen the death-burial interval[3].

B.2 Converting Dates to Decimal Format

Full dates were assigned a decimal value of the form: $year + \frac{DayinYear-1}{365}$, where $DayinYear$ is the day in year from 1-365. Where dates were missing an exact month, day or both, but a year was reported, a month and/or a day were assigned by randomly generating a value in the range 0-30 (day, 28 for February) and 1-12 (month). This random assignment was executed at the individual observation level (as opposed to the unique date level). Where the date was reported within a year (a range given in months or days, the midpoint was taken). For ranges over a few years, the mid point year was assigned and a month and day randomly generated as described previously. Each observed date, of date quality 1-4, was thus assigned a date value of the form $year + \frac{DayinYear-1}{365}$.

B.3 Basic Description of Counts and Data Quality

Table 4 reports the counts and average date quality for birth, first marriage and death dates in the sample. Additional, the proportion female (as observed from births) is detailed here too. Figure 1 plots over 2,000 years of average data quality by type of life event, by half century. Another indicator of data quality is to calculate the extent of "age heaping" in the data. A simple formula for this is $H = 5/4 * (X - 20)$ Clark (2007). This is reported in table 1 of the main paper.

B.4 Calculating Age at Death

Age at death is calculated as $ExactDeathDate - ExactBirthDate$. Obvious mistakes, such as negative ages at death and ages at death above 123 (the oldest verified human was Jeanne Calment who died in 1997 at 122 years Whitney (1997)).

B.5 Calculating Age at First Marriage

Age at first marriage is calculated as $Exact1stMarriageDate - ExactBirthDate$. For this exercise, only first marriages were considered. The database records illicit unions as well as legitimate marriages. For instance, Philippe III "le Bon", duc de Bourgogne, 1396-1467 had 29 children with 13 women. 26 were bastards. He was married three times only. (See his Wikipedia page for more: http://en.wikipedia.org/wiki/Philip_the_Good.)

[3]There was geographic variation here too: This was more common in France than England (Martensen (2004, p.101)

	N			Average Data Quality			Prop.
	B	D	M	B	D	M	Female
-300	2			2.00			0.00
-200	8	6		2.13	3.83		0.00
-100	6	1		3.00	4.00		0.00
0	11	3		3.82	4.00		0.00
100	33	14	7	3.79	2.00	1.29	0.15
200	82	11	16	4.00	3.64	4.00	0.16
300	170	23	31	3.88	2.91	3.71	0.12
400	658	46	66	3.98	3.00	3.71	0.16
500	798	184	100	3.95	3.02	3.78	0.19
600	548	199	81	3.92	2.90	3.72	0.17
700	707	193	77	3.90	2.94	3.70	0.21
800	1,438	434	194	3.88	2.61	3.39	0.28
900	2,586	922	377	3.91	2.49	3.46	0.32
1000	4,821	1,762	861	3.92	2.33	3.57	0.33
1100	9,550	3,823	1,810	3.89	2.38	3.36	0.32
1200	17,675	7,394	3,246	3.79	2.38	3.04	0.32
1300	31,857	12,266	5,689	3.82	2.10	2.85	0.32
1400	63,476	13,969	8,778	3.87	2.01	2.62	0.34
1500	122,992	36,664	31,311	3.18	1.63	1.93	0.42
1600	159,099	92,171	80,787	2.17	1.40	1.70	0.44
1700	74,665	59,383	38,949	1.79	1.43	1.81	0.44
1800	62,282	48,207	42,916	1.76	1.50	1.60	0.44
1900	2,993	10,186	6,859	1.17	1.25	1.14	0.40
2000		201			1.14		

Table 4: Data Counts, Average Quality and Proportion Female by Century

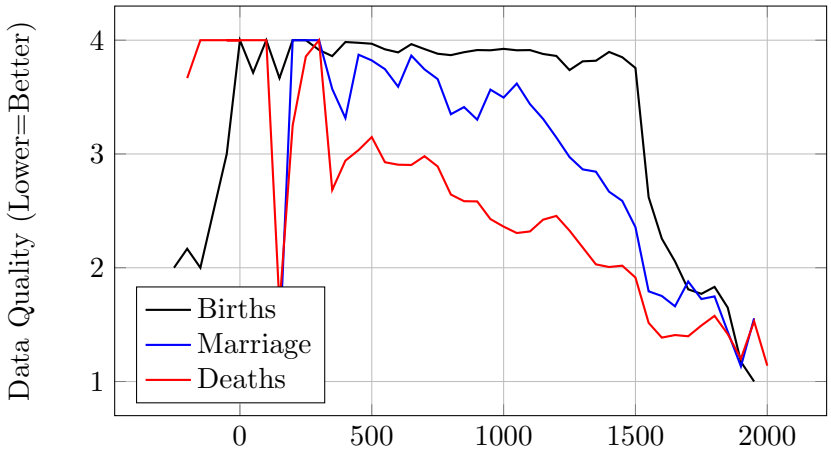

Figure 1: Data Quality by Half century

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
-300																2	
-200																3	
-100																2	
0																3	
100																5	
200																12	
300														16		10	4
400		1												21		25	12
500		1												73		24	27
600		2												65		39	16
700		7												105		37	27
800		30												311		55	69
900		39												570		81	108
1000	6	121												1,031		56	148
1100	51	215												1,910		70	249
1200	385	480								1		1	1	2,981		66	353
1300	350	743					1			3		9	4	4,768		50	492
1400	98	877	1		2		26	1		24		12	6	6,564		113	838
1500	10	2,911	6	6	2		6,694	5	41	430	1	569	15	13,193	2	84	3,418
1600		10,094	1	2	2	85	21,887	1	333	723	1	1,546	2	11,904	2	149	7,353
1700		16,399				155	8,007		10	302		1,030		2,932	10	92	7,392
1800		18,852				137	588			18		434		818	34	16	3,134
1900		933					1					6		27			27

Table 5: Counts by Tree and by Birth Century, Age at Death Observations

	1	2	6	7	9	10	12	14	15	16	17
300								9			
400								9			1
500		1						31			3
600		1						14			
700		3						23			2
800		17						94			1
900		22						186		1	4
1000	1	57						380		2	18
1100	17	125						673			17
1200	119	258						1,196			55
1300	106	430					3	2,038			71
1400	27	460		5		1	1	2,743			104
1500	3	1,607		929	10	68	175	4,910		7	479
1600		5,264	2	2,733	99	87	513	3,901		44	1,334
1700		9,731	7	571	5	52	378	1,165	3	37	2,091
1800		10,764	4	97		3	189	324	7	1	961
1,900		424						14			6

Table 6: Counts by Tree and by Birth Century, Age at Marriage Observations

C Suffixes

Noble status was indicated by the presence of a suffix, e.g King, Prince, Duke etc. Where a suffix indicated noble status, an individual was recorded as "noble". Table 7 reports the average of this nobility measure for each of the 17 family trees.

Each suffix was assigned to one of 17 noble ranks. The ranking system is simple but clumsy. It is inferred from recent general sources such as Doyle (2010) and also Burke and Burke (1881)[4]**.** As "Lord" is generally used (in more recent centuries) as a generic marker of peerage (at least in the UK), individuals with the title Lord have been assigned the same noble rank as Barons (9/17).

[4]Each suffix was translated to English using http://en.wikipedia.org/wiki/Royal_and_noble_ranks

Tree Title	N	Nfam	Nsources	DNoble
British Isles. Heraldic Baronage	14,250	7,752	1	.16
British Isles. Peerage, Baronetage, and Landed Gentry families.	224,298	107,851	273	.13
England. Bedfordshire Visitation, 1566, 1582, 1634	7,077	3,263	2	.06
England. Essex Visitation	15,323	7,475	2	.08
England. Gloucestershire Visitation	9,751	4,548	1	.06
England. Leicester. Long Clawson Parish	20,727	6,395	10	.00
England. London. Residents of London	296,142	93,972	90	.00
England. London. Visitation of London 1633-1635	16,578	7,481	3	.01
England. London. Visitation of London, 1664	4,686	2,131	1	.01
England. Norfolk. 1563 Visitation of Norfolk	22,926	9,457	1	.04
England. Surrey. Visitation of Surrey	9,314	4,290	1	.04
England. Sussex. Genealogies of Families Living In Sussex	20,342	7,880	2	.02
England. Yorkshire. Visitation of Yorkshire. 1563-1564	16,717	7,785	1	.06
Europe: Royal and Noble Houses of Europe	305,153	149,763	2040	.29
Ireland, County Down, Newry area	73,826	14,909	1	.00
Ireland. Early Irish Families	4,295	2,294	129	.16
Wales. Welsh Medieval Database Primarily of Nobility and Gentry	267,847	134,653	713	.04

Table 7: DNoble by Family Tree

Rank	English Title	N
1	Emperor	181
2	King	1,837
3	Grand Duke, ArchDuke, Ancient	971
4	Duke	2,876
5	Prince-Elector, Prince	1,772
6	Earl, Count	13,645
7	Marquess, Margrave	5,952
8	Viscount	3,276
9	Baron, Lord	36,341
10	Baronet	10,410
11	Knight	24,134
12	Esquire, Gentleman and unassigned nobility	7,789
13	Geographic	7,430
14	Military	564
15	Religious	6,591
16	Occupational	6,893
17	No Suffix, Meaningless Suffix	1,198,804

Table 8: Simple Noble Ranking

D Geo-coding

There are 117,975 variations of addresses of birth, marriage and death detailed in the 1.3m family tree records. They have been Geo-coded for longitude and latitude using Google maps (exploring a web automator Imacros (http://imacros.net/) and a Google Maps batch Geo-coder available at http://www.gpsvisualizer.com/geocoder/)[5]

Many addresses were not found. "Prussia" was replaced by "Germany" and each unassigned string was split into constituent elements and re-searched until a geocode could be applied. For example, the address "of, Coomere, Colemere, Ellesmere, Shropshire, England" resulted in no result but removing the first element and searching for "Colemere, Ellesmere, Shropshire, England" resulted in a specific address. This process was followed for every result which was not found or returned a result at the "state/province" level.

Finally, where the address was still unassigned, or where the address was assigned a "state/province" level geocode, Bing maps was used. In 10,306 cases (8.7%) Bing maps returned a more specific geocode than Google maps. Finally, all entries were inspected in excel and misattributions corrected. Further manipulation, such as swapping the historic Welsh county of "Breconshire" for modern name of "Brecon" was executed based on eyeballing the results. Other manual fixes were: changing "Czechoslovakia" for "Czech Republic" and "Slovakia" (and searching for both). London addresses that were listed as churches/parishes received special attention. Each London entry was cross referenced with Burton et al. (2004) and its reported easting/northing coordinates were converted to longitude/latitude.

Ultimately, Google maps was the source for the vast majority (107,246), followed by Bing (9,644) and Burton et al. (2004) (1,085 - primarily London parishes). Inevitably, many mistakes remain in the data...

Table 9 reports the precision of the longitude/latitude co-ordinates[6]. There are 55,495 unique coordinates.

As each location corresponded to a specific life event and because there were so many

[5]Manual evaluation of a small sample of addresses indicated that Google maps was consistently the best quality geocoder relative to alternatives such as Microsoft's bing maps. For example, present day Dún Laoghaire, a small coastal town south of Dublin in Ireland, used to be known as Kingstown. Looking up "Kingstown, Dublin" in Bing resulted in an incorrect set of coordinates north of the city (http://www.bing.com/maps/), while it was correctly located in present day Dún Laoghaire using Google maps(https://www.google.co.uk/maps) (search executed 31 March 2014).

[6]Here "Specific" corresponds to the following precision codes returned by Google maps: "street", "premise", "sublocality", "Neighborhood", "natural_feature", "point_of_interest", "church", "politica", "Parish", "country", "postal_town", "administrative_area_level_3", "park", "Museum", "Google", "colloquial_area", "address", "university", "establishment", "Hospital", "HigherEducationFacility","TouristStructure", "police", "place_of_worship", "sub-county/district", "apartment/suite", "campground", "Library", "Cemetery", "RailwayStation", "post_office", "MetroStation", "city_hall", "embassy", "parking", "River", "courthouse", "CulturalRegion", "Island", "LandmarkBuilding", "synagogue", "HistoricalSite", "Region", "Bay", "ReligiousStructure", "Channel", "Lake", "Ocean", "AdministrativeBuilding", "sublocality_level_1", "Valley", "Volcano" and "Marina".

Precision	N	
	Unique	All
Country	4,886	22,433
State/province	1,433	5,943
County/district	9,117	37,933
City/town	51,301	230,101
Country	4,886	22,433
Specific	50,098	261,984
Not found	1,140	3,062

Table 9: Geo-code Quality

missing values, a single 'attributed' geocode was created based on the following order of priority, from highest to lowest: birth/christening, marriage and death. (Codes were assigned iteratively until filled.) Following this the same process was followed using (if available) the geocodes for the marriage of parents, birth of parents, death of parents, birth, marriage, death of siblings, spouse's death and finally birth place of children. This process resulted in the attribution of 1,0213,96 of 1,329,466 records. The remaining records were assigned the average longitude and latitude of the family tree records set they belonged to. This attributed geocode was designed as blunt control for geography in the analysis.

E The Sources

E.1 Source Description

The sources used for the 17 sampled family trees are extensive. Principally, the entries are constructed from published works such as "An Official Genealogical and Heraldic Baronage of England" Paget (1957), numerous other published works based on Heraldic Visitations in England in the 16th and 17th centuries, census records, parish registers and other published family genealogies.

The source information is detailed in table 10[7].

An accompanying pdf file details all 3,133 sources (including publisher and repository information) (self-cite 2014). Here the top 15 sources are reported (table 11) and a random selection of 15 sources (outside the top 15) are listed in table 12.

[7]The "British Isles. Peerage, Baronetage, and Landed Gentry families. (tree code Nixon) does not have the number of sources indicated or referenced in the online data as of April 2014. 116,312/224,298 don't have source information.

ID	Tree	N	Sources Avg.	SD	Min	Max
1	British Isles. Heraldic Baronage	14,251	1.00	0.00	1	1
2	British Isles. Peerage, Baronetage, and Landed Gentry families with extended lineage	224,298	1.11	0.45	1	17
3	England. Bedfordshire Visitation, 1566, 1582, 1634	7,079	1.00	0.00	1	1
4	England. Essex Visitation	15,325	1.00	0.00	1	1
5	England. Gloucestershire Visitation	9,756	1.00	0.00	1	1
6	England. Leicester. Long Clawson Parish	20,739	1.00	0.00	1	1
7	England. London. Residents of London	296,171	1.04	0.20	1	8
8	England. London. Visitation of London 1633-1635	16,579	1.00	0.00	1	1
9	England. London. Visitation of London, 1664	4,686	1.00	0.00	1	1
10	England. Norfolk. 1563 Visitation of Norfolk	23,010	1.00	0.00	1	1
11	England. Surrey. Visitation of Surrey	9,350	1.00	0.00	1	1
12	England. Sussex. Genealogies of Families Living In Sussex	20,370	1.00	0.04	1	2
13	England. Yorkshire. Visitation of Yorkshire. 1563-1564	16,730	1.00	0.00	1	1
14	Europe: Royal and Noble Houses of Europe	305,153	1.73	1.84	1	63
15	Ireland, County Down, Newry area	73,827	1.00	0.00	1	1
16	Ireland. Early Irish Families	4,295	1.64	1.26	1	17
17	Wales. Welsh Medieval Database Primarily of Nobility and Gentry	267,847	1.83	1.55	1	44

Table 10: Family Tree Sources, Summary Information

	Tree	Title	Author	N
1	7	Pedigrees with Index of London Citizens, abt. 1600-1800 (filmed 1954)	Boyd, Percival, compiler	248,348
2	14	A Genealogical and Heraldic Dictionary of the Peerage and Baronetage	Burke, Bernard and Burke, John Bernard	127,269
3	14	Histoire de la maison royale de France anciens barons du royaume: et des grands officiers de la couronne (1726, reprint 1967-1968)	Saint-Marie, Anselme de	73,723
4	14	Europaische Stammtafeln: Stammtafeln zur Geschichte der europaischen Staaten. Neue Folge -1978	Schwennicke, Detlev	70,835
5	15	Histories of Newry Families, Prior to 1910	Philip Crossle	60,861
6	17	Welsh Genealogies AD 1400-1500 -1983	Bartrum, Peter Clement	55,774
7	17	British Genealogy (filmed 1950)	Evans, Alcwyn Caryni	50,320
8	17	Heraldic Visitations of Wales and Part of the Marches Between the Years 1586 and 1613 by Lewys Dwnn (1846)	Dwnn, Lewys; transcribed and edited with notes by Sir Samuel Rush Meyrick	48,050
9	17	Genealogy of Shropshire (filmed 1966)	Morris, Joseph	46,103
10	17	The Golden Grove books of pedigrees (filmed 1970)		42,251
11	17	Pedigrees of Anglesey and Carnarvonshire Families: with Their Collateral Branches in Denbighshire, Merionethshire (1914)	Griffith, John Edwards	38,547
12	2	The Complete Peerage of England, Scotland, Ireland, Great Britain and the United Kingdom, Extant, Extinct, or Dormant (1910)	Cokayne, George Edward (main author) and Vicary Gibbs (added author)	31,856
13	17	Welsh Genealogies, AD 300-1400 -(1980)	Bartrum, Peter Clement	27,549
14	2	Visitation of England and Wales (1893-1921)	Howard, Joseph Jackson	25,419
15	17	The History of the Princes, the Lords Marcher and the Ancient Nobility of Powys Fodog and the Ancient Lords of Arwystli, Cedewen and Meirionydd (1881-1887)	Lloyd, Jacob Youde William	24,549

Table 11: Top 15 Sources

Rank	Tree	Title	Author	N
1447	14	Notices of an English branch of the Malet family	Malet, Arthur	20
313	7	The Register Book of The Parish of St. Christopher-le-Stocks, in the City of London (1882)	Church of England. St. Christopher-le-Stocks. Edited by Edwin Freshfield	373
994	17	Debrett's Baronetage of England	Collen, George William	51
1740	14	Saladin and the Fall of Jerusalem (1987)	Regan, Geoffrey	11
2066	14	Anglo-Saxon England (3rd edition, 1971)	Stenton, Frank Merry	5
2585	14	The Serbians: the Story of a People (1988)	Pavlovich, Paul	2
2995	2	A History and Genealogy of the Families of Bulloch and Stobo and of Irvine of Cults (1911)	Bulloc, Joseph Gaston Baillie	1
2948	14	The House of Cornewall (1908)	Liverpool, Cecil George Savile Foljambe	1
456	14	Baronia Anglica Concentrata, Or, a Concentrated Account of All the Baronies Commonly Called Baronies in Fee: Deriving Their Origin from Writ of Summons, and Not from Any Specific Limited Creation (1843-1844)	Banks, Thomas Christopher	204
870	17	Welsh Tribal Patriarchs	Bartrum, Peter C.	67
179	2	Fasti Ecclesiæ Scoticanæ: the Succession of Ministers in the Church of Scotland from the Reformation (1915-)	Scott, Hew	847
1141	14	Árpád vére: Hohenlohe (1904)	Zarándy, Gáspár A.	37
1922	14	A herceg Festetics-család története (1928)	Szabó, Dezso	7
1131	14	Notes and Queries: a Medium of Intercommunication for Literary Men, General Readers, Etc. (1850-)		38
1715	14	Royal descent of 500 immigrants to the US	Roberts, Gary Boyd	12

Table 12: Random 15 Sources

F Lists of Observations

Name	BYR	Bplace	AgeD	NS
Adalbert I Duke in Alsace	675	Alsace-Lorraine, France	66.16	2
Hermann IV Herzog von Schwaben Markgraf von Turin	1015	Schwaben, Bavaria	23.41	8
Guillem Jordan de Cerdanya Conde de Cerdanya y Berga	1077	Girona, Spain	32.16	2
Christine Sigurdsdatter, Princess of Norway	1125	Trøndhjem, Sør-Trøndelag, Norway	52.48	3
Malise 6th Earl of Strathearn	1257		55.52	9
Friedrich II von Kyrburg	1313	Kyrburg, Rheinland, Prussia	52.17	2
Croyser, Sir William Knight	1340	Ruthin, Denbighshire, Wales	47.14	2
Mologa, Ivan Mikhailovich Prince of	1347	Mologa, Yaroslavl', Russia	33.55	6
Assendelft, Hugo van	1361	Assendelft, Noord-Holland, Netherlands	36.47	1
Hopton, Sir Arthur	1489		66.18	4
Lygon, John	1496		79.92	5
Lyttleton, Sir John	1499	Frankley, Worcestershire, England	32.88	12

Table 13: Random 12 Observations from Family Tree 14, the European Nobility

G Distributions, Supplementary Regression and Analysis Tables

Table 14 reports the titles, sample size and number of sources for the ten family trees databases used in this paper.

G.1 Supplementary Regression/Analysis Tables

Tree ID	Tree Title	N	Nsources
1	British Isles. Heraldic Baronage	14,799	1
2	British Isles. Peerage, Baronetage, and Landed Gentry.	225,220	273
6	England. Leicester. Long Clawson.	20,739	10
7	England. London. Residents.	296,738	90
9	England. London. Visitation, 1664	4,686	1
10	England. Norfolk. 1563 Visitation.	23,098	1
12	England. Sussex. Genealogies.	20,508	2
14	Europe: Royal and Noble Houses	332,511	2,040
16	Ireland. Early Irish Families	4,295	129
17	Wales. Welsh Medieval Nobility and Gentry	267,857	713

Notes: The family tree records were constructed from published sources by the LDS church and various collaborators. They are available at https://histfam.familysearch.org.

Table 14: The Sample of Family Trees

	Tree ID									
	1	2	6	7	9	10	12	14	16	17
pre-800		11						280	162	86
800		30						311	55	69
900		39						570	81	108
1000	6	121						1,031	56	148
1100	51	215						1,910	70	249
1200	385	480				1	1	2,981	66	353
1300	350	743		1		3	9	4,768	50	492
1400	98	877		26		24	12	6,564	113	838
1500	10	2,911		6,694	41	430	569	13,193	84	3,418
1600		10,094	85	21,887	333	723	1,546	11,904	149	7,353
1700		16,399	155	8,007	10	302	1,030	2,932	92	7,392
1800		18,852	137	588		18	434	818	16	3,134
1900		933		1			6	27		27

Notes: See table 1 for tree titles. The paper examines the 800-1800 period where the data is dense enough to allow robust estimation. Source: Noble sample.

Table 15: Counts by Century and Tree ID, Age at Death Observed

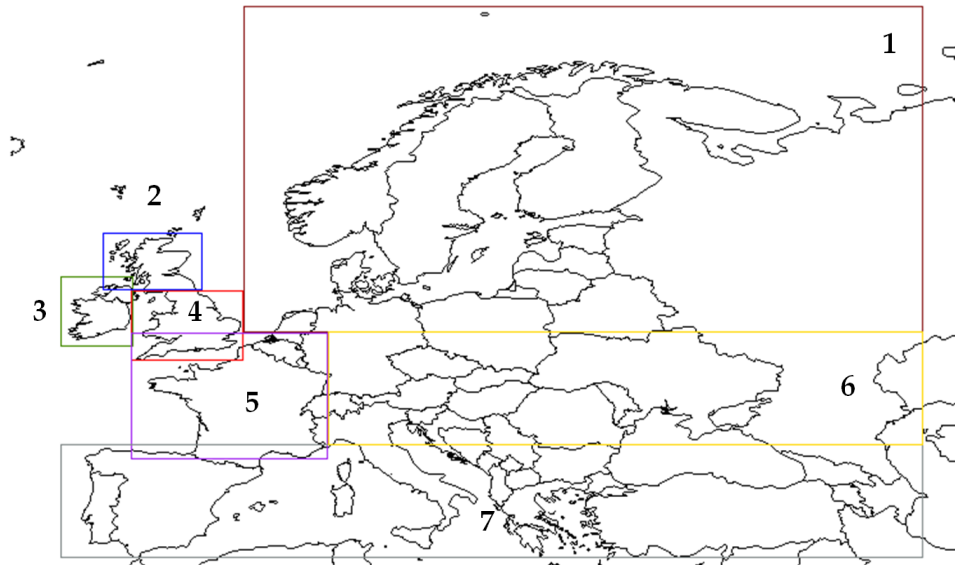

Figure 2: Regions used

Notes: Overlapping regions were assigned to the Northern most region.

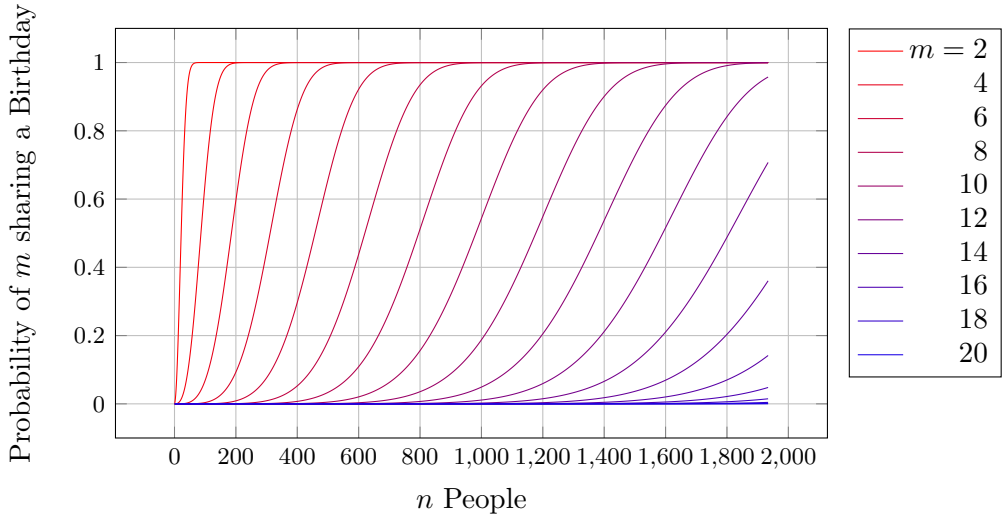

Figure 3: Expected Probabilities of Shared Death Days

Notes: m = the number of people sharing a birthday, n = the number of people at risk (e.g born in a given year). Calculated using the birthday command in R: http://www.inside-r.org/r-doc/stats/qbirthday

	Dependent variable:
	violent
	(1) (2)
Emperor	−1.227
	(1.066)
King	0.055
	(0.214)
Grand Duke, ArchDuke, Ancient	−0.264
	(0.412)
Duke	−0.102
	(0.167)
Prince-Elector, Prince	0.025
	(0.255)
Earl, Count	0.116
	(0.092)
Marquess, Margrave	0.698***
	(0.123)
Viscount	0.100
	(0.224)
Baron, Lord	0.465***
	(0.074)
Baronet	−0.422***
	(0.151)
Knight	0.212**
	(0.107)
Esquire, Gentleman and unassigned nobility	0.050
	(0.161)
Geographic	1.028***
	(0.163)
Military	0.607
	(0.597)
Religious	−0.629**
	(0.248)
Occupational	−0.332**
	(0.164)
Note:	*p<0.1; **p<0.05; ***p<0.01

Table 16: Noble Rank Correlations with a Violent Battle Death, Logistic Regression

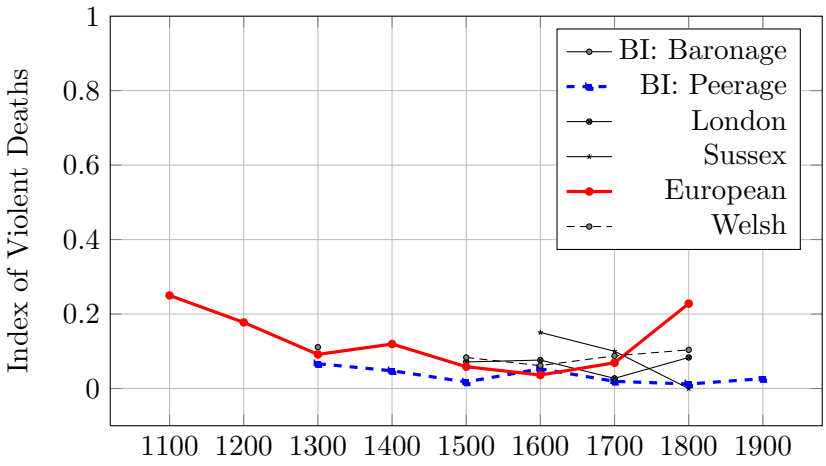

Figure 4: Index of Violent Battle Deaths, Female

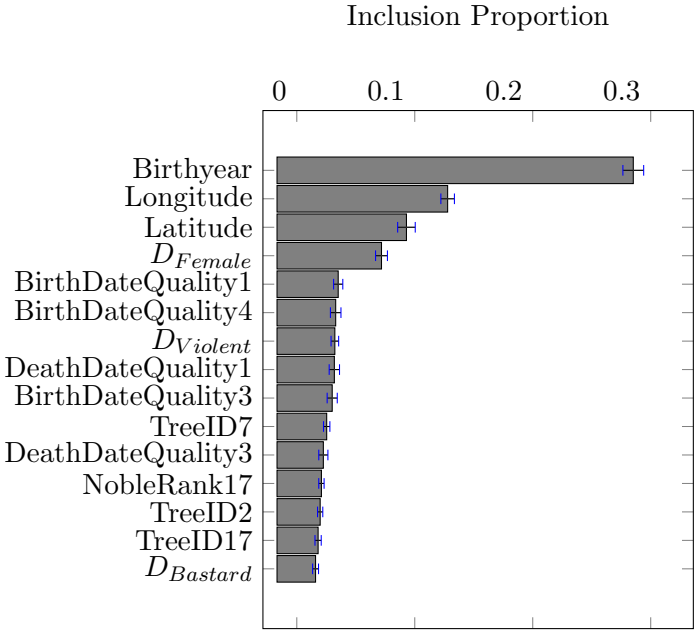

Figure 5: Top 15 Variables in BART model

H Robustness Checks

H.1 Is the geographic pattern of noble longevity a result of deaths on the Southern and Eastern frontier?

To test whether the geographic pattern of noble longevity reported in this paper is a result of nobles dying on the Southern and Eastern frontier, table 17 reports the same regressions reported in table 7 of the main paper - but this time only using latitude and longitude of birth. The scale and direction of the coefficients reinforce the pattern reported earlier. with the important exception that the significance of the latitude effects disappears after 1700.

H.2 Grouping the age predictions by half-century of birth

Figure 6 reports the expected age at death for each 50 year birth period from 800 to 1800. As with figure 8(a) in the main paper, the 95% confidence intervals are too wide to allow over-interpretation of any trends in noble longevity before 1400 but after 1400 there does appear to be a sudden and sharp uptick in noble longevity - From a mean of around 50 to 54. After 1500, lifespan seems to decline until around 1650 where an uninterrupted rise begins.

H.3 The effects of crisis years

Using the birthday-problem algorithm presented in the main paper I have detected 97 'crisis years where there are more than 10 coincident deaths[8]. Figure 7 reports the predicted age at death but excluding those dying in the 97 crisis years. The overall trend is the same.

[8]The crisis years are: 1014, 1120, 1265, 1298, 1302, 1314, 1330, 1332, 1333, 1346, 1356, 1364, 1386, 1396, 1403, 1415, 1422, 1424, 1426, 1455, 1459, 1460, 1462, 1471, 1485, 1513, 1515, 1526, 1544, 1547, 1557, 1558, 1563, 1567, 1571, 1572, 1578, 1587, 1593, 1596, 1600, 1602, 1603, 1606, 1609, 1615, 1623, 1625, 1629, 1630, 1636, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1649, 1650, 1652, 1654, 1664, 1665, 1666, 1667, 1671, 1675, 1681, 1685, 1690, 1691, 1693, 1698, 1700, 1703, 1709, 1711, 1720, 1734, 1738, 1739, 1743, 1747, 1802, 1803, 1815, 1822, 1835, 1845, 1854, 1855, 1856, 1878, 1915 and 1916.

	Dependent variable:					
	Age at Death (>= 20)					
	(1)	(2)	(3)	(4)	(5)	(6)
Birth	800-	1000-	1340-	1500-	1600-	1700-
Half-Century	1000	1340	1500	1600	1700	1800
Birth Latitude	−.111	.109***	.211***	.204***	.012	.013
	(.096)	(.036)	(.034)	(.039)	(.033)	(.016)
Birth Longitude	−.045	−.116***	−.126***	−.082***	−.071***	−.025***
	(.069)	(.019)	(.020)	(.016)	(.011)	(.007)
D_{Female}	2.990**	.670	−1.035**	−.451	−.174	1.974***
	(1.481)	(.472)	(.424)	(.306)	(.267)	(.247)
$D_{Violent}$	−.024	−8.072***	−8.919***	−8.739***	−7.747***	−2.984**
	(4.297)	(1.307)	(1.018)	(1.137)	(1.137)	(1.201)
$D_{Bastard}$	−7.068	−4.217**	.091	.420	−1.168	1.489
	(5.745)	(1.804)	(1.488)	(2.331)	(3.032)	(4.828)
Birth Year	3.295**	1.631***	1.167**	2.317***	1.874***	.933***
Ends in 0	(1.313)	(.472)	(.465)	(.383)	(.341)	(.343)
Controls						
Noble Rank	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
Family Tree	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
Data Quality	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*
N	1,107	8,273	9,526	17,037	23,825	27,903
R^2	.029	.047	.051	.075	.046	.030
Adjusted R^2	.004	.043	.047	.073	.044	.029
Residual Std. Error	16.879	16.692	17.151	17.514	18.339	18.509
F Statistic	1.148	12.258***	14.523***	38.189***	31.555***	23.896***
Note:						*p<.1; **p<.05; ***p<.01

Table 17: Estimating by Sub periods - Geographic Effects by Birth Location

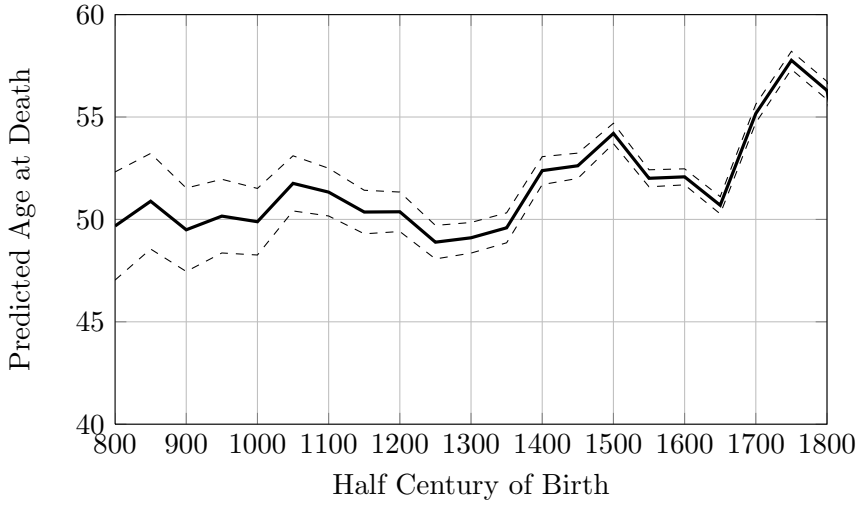

Figure 6: Expected Lifespan 800-1800

Notes: Expected values are from the birth period coefficents estimated by OLS estimation (equation 2). Error bands indicate 95% confidence intervals. Average longitude and latiude is applied (50.09, -.015), all other controls are set to 0. Source: Noble sample.

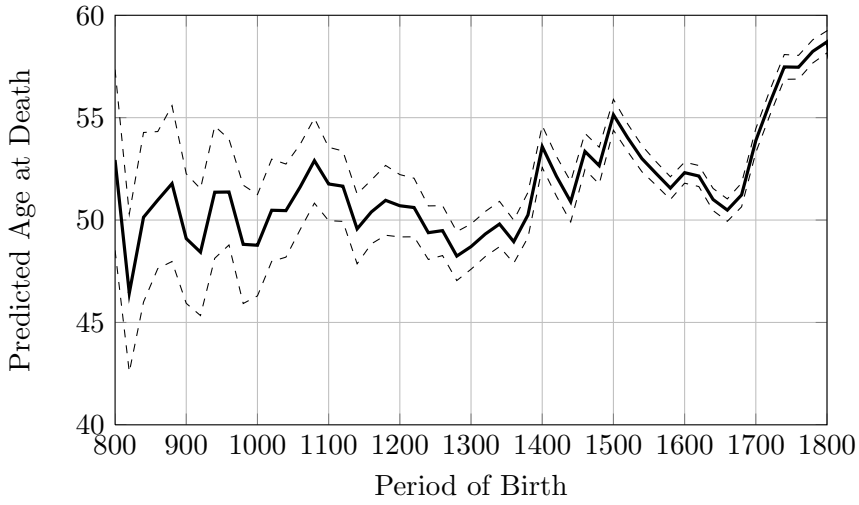

Figure 7: Expected Lifespan 800-1800, excluding 97 crisis years

Notes: Expected values are from the birth period coefficents estimated by OLS estimation (equation 2). Error bands indicate 95% confidence intervals. Average longitude and latiude is applied (50.09, -.015), all other controls are set to 0. Source: Noble sample.

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