Childless Aristocrats. Fertility, Inheritance, and Persistent Inequality in Britain (1650 – 1882)

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Motivation

Movement on the social ladder has changed little over eight centuries. (Clark 2014)

1. Inequality is highly persistent.
   - 1066: 40 Norman noblemen held a third of all land.
   - 1850s: $>$ 5,000 landowners owned more than 50% of all land.
   - Today: $>$ 1% of the population owns 70% of all land.

2. Inheritance rules are crucial for the persistence of inequality.

3. Demographics is important in mediating this effect.
   - Low fertility ensures that wealth in few hands.
   - High fertility ensures lineage continuation

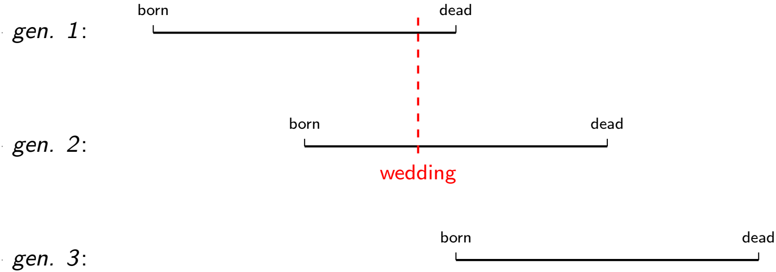
We look at the interaction between inheritance and fertility decisions in a historical context of highly persistence of inequality; Britain, 1650-1882.

Childlessness in the elite

* sample: married wom whose father is a peer: ** sources: Wrigley et al. (1997), Anderson (1998)

▸ Intensive margin ▸ Surviving children ▸ Other peers

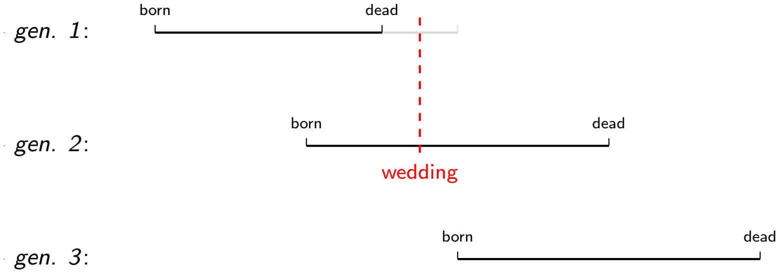
Marriage settlements



Settlement is signed:

- The family head (gen. 1) is a tenant for life.
- Once he inherits, the heir (gen. 2) is a life tenant.
  - i.e., has to keep the estate untouched.
- Next generation's heir (gen. 3) is the beneficiary.

Marriage settlements



Settlement is NOT signed:

- The family head (gen. 1) is dead.
- Once he inherits, the heir (gen. 2) is a free holder.
  - i.e., can sell the estate, mortgage it, etc.
- Next generation's heir (gen. 3) is "unprotected."

example history prevalence

This paper

Empirical contribution: Estimate the effect of marriage settlements on childlessness

- Data for c. 1,500 peers and their offspring (1650-1882).
- Identification uses the demographic aspect of settlements.
- Signing a settlement increases the probability to have at least one child by 15 pp.

Theoretical contribution: Rationalize this reduced-form effect in an OLG model that links inheritance, fertility, and inequality.

- We rationalize settlements with hyperbolic discounting.
- Inter-generational altruism can explain the effect of settlements on childlessness.

Literature

1. Historical demography
   - Henry and Lévy (1960); Clark and Cummins (2009); Goñi (2015); Marcassa, Pouyet and Trégouet (2016); de la Croix and Brée (2016); de la Croix, Schneider and Weisdorf (2016)
2. Fertility and inequality
   - Number of children: Deaton and Paxton (1997); Caucutt, Guner and Knowles (2002); Kremer and Chen (2002); de la Croix and Doepke (2003)
   - Childlessness: Aaronson, Lange, and Mazumder (2014); Baudin, de la Croix, and Gobbi (2015) Gobbi (2013)
3. Inheritance and inequality
   - Habakkuk (1950); Chu (1991); Bertochi (2006); Allen (2009); Piketty (2011)
4. Hyperbolic discounting
   - Phelps and Pollack (1968); Laibson (1997); Krusell and Smith (2003); Paserman (2008); Wigniolle (2008); Wrede (2011)

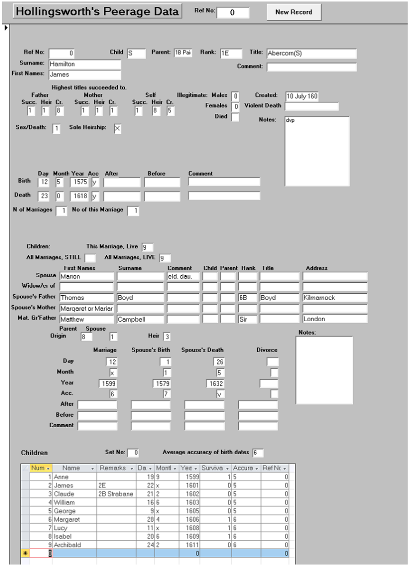
Road map

Data sources

VII. 1876. *5.* CHARLES GEORGE (LYTTELTON), LORD LYTTELTON, BARON OF FRANKLEY [1794] also BARON WESTCOTE OF BALLYMORE in the peerage of Ireland [1776] also *a Baronet* [1618], s. and h., by 1st wife, *b.* 27 Oct. 1842; ed. at Eton and at Trin. Coll., Cambridge; M.P. for East Worcestershire, 1868-74: *suc. to the peerage,* 18 April 1876; Land Commr., 1881-89; *suc.* as VISCOUNT COBHAM AND BARON COBHAM, on the death, 26 March 1889, of his distant cousin (the Duke of Buckingham and Chandos, Viscount Cobham. &c.). under the *spec. rem.* in the creation of that dignity. 23 May 1718. He *m.* 19 Oct. 1878, Mary Susan Caroline, 2d da. of William George (CAVENDISH), 2d BARON CHESHAM, by Henrietta Frances. da. of the Rt. Hon. William Saunders Sebright LASCELLES. She was *b.* 19 March 1853.

Source: Cokayne's Complete Peerage (1913)

Hollingsworth dataset



Hollingsworth's Peerage Data — Ref No: 0 — New Record

Ref No: 0 — Child: S — Parent: 1B Pai — Rank: 1E — Title: Abercorn(S)
Comment:
Surname: Hamilton
First Names: James

Highest titles succeeded to.

	Father			Mother			Self		
	Succ.	Heir	Cr.	Succ.	Heir	Cr.	Succ.	Heir	Cr.
	1	1	8	1	1	1	1	8	5

Illegitimate: Males 0 — Females 0 — Died
Created: 10 July 160 — Violent Death: — Notes: dvp
Sex/Death: 1 — Sole Heirship: X

	Day	Month	Year	Acc	After	Before	Comment
Birth	12	5	1575	y			
Death	23	0	1618	y			

N of Marriages: 1 — No of this Marriage: 1

Children: This Marriage, Live 9
All Marriages, STILL — All Marriages, LIVE 9

	First Names	Surname	Comment	Child	Parent	Rank	Title	Address
Spouse	Marion		eld. dau.					
Widow/er of								
Spouse's Father	Thomas	Boyd				6B	Boyd	Kilmarnock
Spouse's Mother	Margaret or Mariar							
Mat. Gr'Father	Matthew	Campbell				Sir		London

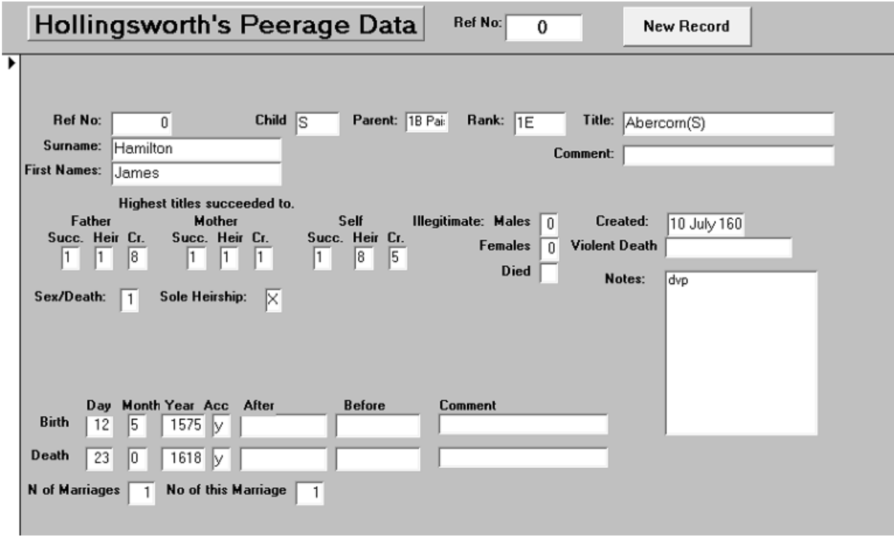
Origin — Parent: 8 — Spouse: 1 — Heir: 3

	Marriage	Spouse's Birth	Spouse's Death	Divorce
Day	12	1	26	
Month	x	1	5	
Year	1599	1579	1632	
Acc.	6	7	y	
After				
Before				
Comment				

Notes:

Children — Set No: 0 — Average accuracy of birth dates: 6

Num	Name	Remarks	Da	Montl	Yea	Surviva	Accura	Ref Nc
1	Anne		19	9	1599	1	5	0
2	James	2E	22	x	1601	0	5	0
3	Claude	2B Strabane	21	2	1602	0	5	0
4	William		16	6	1603	0	5	0
5	George		9	x	1605	0	5	0
6	Margaret		28	4	1606	1	6	0
7	Lucy		11	x	1608	1	6	0
8	Isabel		20	6	1609	1	6	0
9	Archibald		24	2	1611	0	6	0
					0			0


Hollingsworth's Peerage Data
Ref No: 0
New Record
Ref No: 0
Child S
Parent: 1B Pai
Rank: 1E
Title: Abercorn(S)
Surname: Hamilton
Comment:
First Names: James
Highest titles succeeded to.
Father
Succ. Heir Cr.
1 1 8
Mother
Succ. Heir Cr.
1 1 1
Self
Succ. Heir Cr.
1 8 5
Illegitimate: Males 0
Females 0
Died
Created: 10 July 160
Violent Death
Notes: dvp
Sex/Death: 1
Sole Heirship: X
Day Month Year Acc After Before Comment
Birth 12 5 1575 y
Death 23 0 1618 y
N of Marriages 1
No of this Marriage 1

Children: This Marriage, Live 9

All Marriages, STILL All Marriages, LIVE 9

	First Names	Surname	Comment	Child	Parent	Rank	Title	Address
Spouse	Marion		eld. dau.					
Widow/er of								
Spouse's Father	Thomas	Boyd				6B	Boyd	Kilmarnock
Spouse's Mother	Marqaret or Mariar							
Mat. Gr'Father	Matthew	Campbell				Sir		London

	Parent	Spouse
Origin	8	1

Heir 3

Notes:

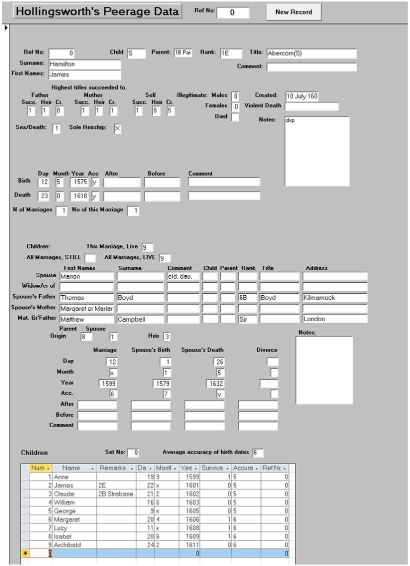
	Marriage	Spouse's Birth	Spouse's Death	Divorce
Day	12	1	26	
Month	x	1	5	
Year	1599	1579	1632	
Acc.	6	7	y	
After				
Before				
Comment				

Children

Set No: 0 Average accuracy of birth dates 6

Num	Name	Remarks	Da	Montl	Yea	Surviva	Accura	Ref Nc
1	Anne		19	9	1599	1	5	0
2	James	2E	22	x	1601	0	5	0
3	Claude	2B Strabane	21	2	1602	0	5	0
4	William		16	6	1603	0	5	0
5	George		9	x	1605	0	5	0
6	Margaret		28	4	1606	1	6	0
7	Lucy		11	x	1608	1	6	0
8	Isabel		20	6	1609	1	6	0

Hollingsworth dataset



Hollingsworth's Peerage Data — Ref No: 0 — New Record

Ref No: 0 Child: S Parent: 1B Pai Rank: 1E Title: Abercorn(S)
Surname: Hamilton Comment:
First Names: James

Highest titles succeeded to.
Father Succ. 1 Heir 1 Cr. 8 — Mother Succ. 1 Heir 1 Cr. 1 — Self Succ. 1 Heir 8 Cr. 5
Illegitimate: Males 0 Females 0 — Died
Created: 10 July 160 — Violent Death
Sex/Death: 1 Sole Heirship: X
Notes: dvp

	Day	Month	Year	Acc	After	Before	Comment
Birth	12	5	1575	y			
Death	23	0	1618	y			

N of Marriages 1 No of this Marriage 1

Children: This Marriage, Live 9
All Marriages, STILL — All Marriages, LIVE 9

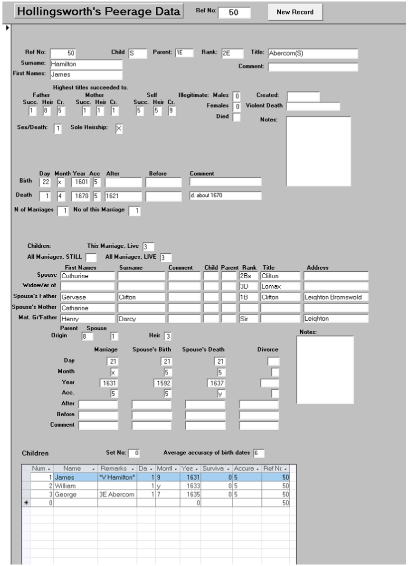
	First Names	Surname	Comment	Child	Parent	Rank	Title	Address
Spouse	Marion		eld. dau.					
Widow/er of								
Spouse's Father	Thomas	Boyd				6B	Boyd	Kilmarnock
Spouse's Mother	Margaret or Marian							
Mat. Gr'Father	Matthew	Campbell				Sir		London

Origin: Parent 8 Spouse 1 — Heir 3 — Notes:

	Marriage	Spouse's Birth	Spouse's Death	Divorce
Day	12	1	26	
Month	x	1	5	
Year	1599	1579	1632	
Acc.	6	7	y	
After				
Before				
Comment				

Children — Set No: 0 — Average accuracy of birth dates 6

Num	Name	Remarks	Da	Montl	Yee	Surviva	Accura	Ref Nc
1	Anne		19	9	1599	1	5	0
2	James	2E	22	x	1601	0	5	0
3	Claude	2B Strabane	21	2	1602	0	5	0
4	William		16	6	1603	0	5	0
5	George		9	x	1605	0	5	0
6	Margaret		28	4	1606	1	6	0
7	Lucy		11	x	1608	1	6	0
8	Isabel		20	6	1609	1	6	0
9	Archibald		24	2	1611	0	6	0
*					0			0



Hollingsworth's Peerage Data — Ref No: 50 — New Record

Ref No: 50 Child: S Parent: 1E Rank: 2E Title: Abercorn(S)
Surname: Hamilton Comment:
First Names: James

Highest titles succeeded to.
Father Succ. 1 Heir 8 Cr. 5 — Mother Succ. 1 Heir 1 Cr. 1 — Self Succ. 5 Heir 5 Cr. 9
Illegitimate: Males 0 Females 0 — Died
Created: — Violent Death
Sex/Death: 1 Sole Heirship: X
Notes:

	Day	Month	Year	Acc	After	Before	Comment
Birth	22	x	1601	5			
Death	1	4	1670	5	1621		d. about 1670

N of Marriages 1 No of this Marriage 1

Children: This Marriage, Live 3
All Marriages, STILL — All Marriages, LIVE 3

	First Names	Surname	Comment	Child	Parent	Rank	Title	Address
Spouse	Catharine					2Bs	Clifton	
Widow/er of						3D	Lomax	
Spouse's Father	Gervase	Clifton				1B	Clifton	Leighton Bromswold
Spouse's Mother	Catharine							
Mat. Gr'Father	Henry	Darcy				Sir		Leighton

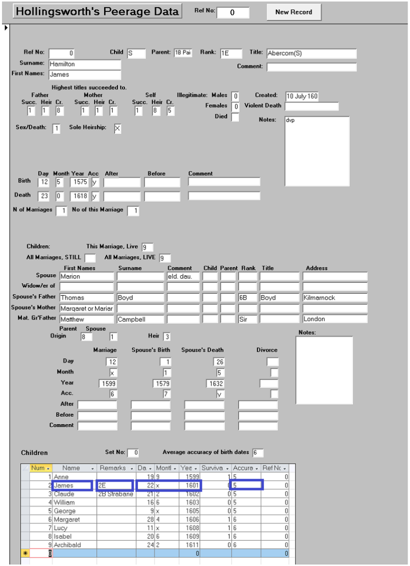
Origin: Parent 8 Spouse 1 — Heir 3 — Notes:

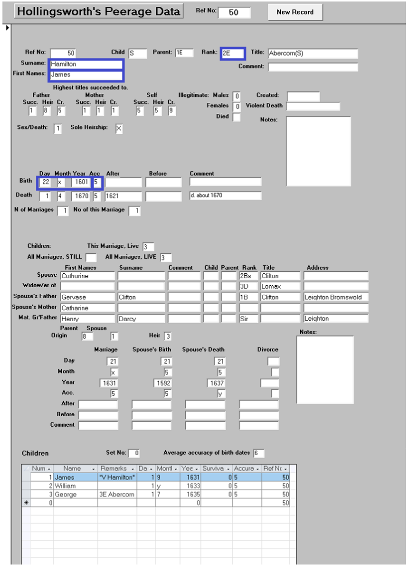
	Marriage	Spouse's Birth	Spouse's Death	Divorce
Day	21	21	21	
Month	x	5	5	
Year	1631	1592	1637	
Acc.	5	5	y	
After				
Before				
Comment				

Children — Set No: 0 — Average accuracy of birth dates 6

Num	Name	Remarks	Da	Montl	Yee	Surviva	Accura	Ref Nc
1	James	"V Hamilton"	1	9	1631	0	5	50
2	William		1	y	1633	0	5	50
3	George	3E Abercorn	1	7	1635	0	5	50
*	0				0			50

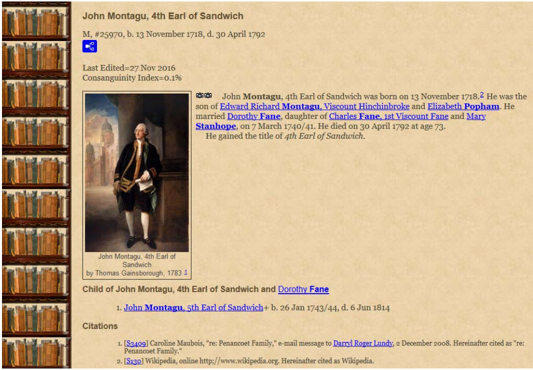
Hollingsworth dataset





Matching sons with fathers in Hollingsworth's dataset

- Using name, surname, date of birth, accuracy, etc. we matched 94.54% of the individuals
- For the remaining 5% (1,554 observations), we used `www.thepeerage.com`



- Final checks if Levenshtein distance between surnames > 1

▸ Levenshtein distance

Summary statistics (1650–1882)

	mean	se	min	max	N	sample
A. Fertility variables						
Childlessness	0.25	0.004	0	1	9,632	married
All live births	3.90	0.038	0	31	9,632	married
All live births (if > 0)	5.20	0.041	0	31	7,234	married, ≥ 1 child
Stillbirths	0.13	0.013	0	9	1,503	married
Last child is a girl	0.53	0.009	0	1	2,776	matched parents
B. Other demographic variables						
Age at first marriage (wom)	23.70	0.083	16	71	5,034	married wom
Age at first marriage (men)	28.75	0.108	16	98	4,816	married men
Age at death (wom)	60.27	0.270	16	104	5,009	married wom
Age at death (men)	61.51	0.240	16	98	4,790	married men
Number of marriages	1.16	0.004	0	4	10,129	married
Never married	0.239	0.004	0	1	12,535	dead after 30
C. Socioeconomic variables						
Baron offspring (non-heir)	0.39	0.005	0	1	10,120	married
Duke offspring (non-heir)	0.44	0.005	0	1	10,120	married
Baron heir	0.08	0.003	0	1	10,120	married
Duke heir	0.09	0.003	0	1	10,120	married
Heir	0.28	0.004	0	1	10,120	married
English peerage	0.48	0.005	0	1	10,120	married
Scottish peerage	0.21	0.004	0	1	10,120	married
Irish peerage	0.31	0.005	0	1	10,120	married
Marrying a commoner	0.67	0.005	0	1	10,120	married
Marrying before father dies [i.e., settlement proxy]	0.75	0.005	0	1	10,120	married

Road map

Empirical analysis

$$\chi_{i,j,b,d} = \delta m_{i,j,b,d} + \mu_j + \mu_b + \mu_d + \mathbf{X}'_{i,j,b,d}\gamma + \epsilon_{i,j,b,d}$$

- χ indicates if individual i did not have any children.
- m is the proxy for signing a settlement (ie., indicates if i's father is alive at the wedding of his heir). proxy
- μ_j, μ_b, and μ_d are family, birth year, and marriage decade FE.
- $\mathbf{X}$: social status, age at marriage (wife), age at death, stillbirths in the family, and number of siblings.

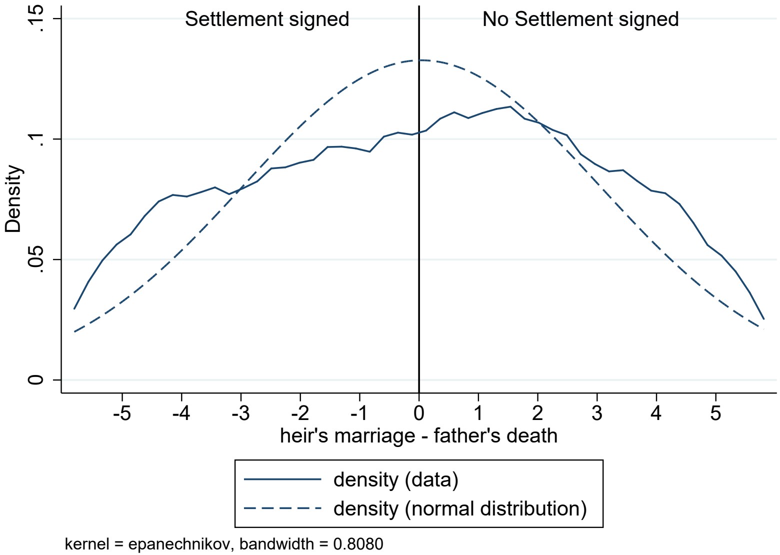
Dep. variable: Childlessness

	(1)	(2)	(3)	(4)
Settlement	-0.049***	-0.052***	-0.035*	-0.083**
[i.e., father died after wedding]	(0.019)	(0.019)	(0.018)	(0.036)
Husband's siblings (#)	-0.001	-0.001	-0.001	-0.003
	(0.002)	(0.002)	(0.002)	(0.005)
Father-in-law is a duke		0.022	0.021	-0.045
		(0.019)	(0.018)	(0.051)
Wife's age at marriage			0.014***	0.013***
			(0.002)	(0.004)
Wife's age at death			0.000	-0.000
			(0.000)	(0.001)
Husband's age at death			-0.003***	-0.004***
			(0.001)	(0.001)
Still to live births (fam)			0.174	1.626***
			(0.311)	(0.612)
Wife's social status	NO	YES	YES	YES
Family FE	NO	NO	NO	YES
Birth year FE	NO	NO	NO	YES
Marriage decade FE	NO	NO	NO	YES
% correctly predicted	81.3	81.2	82.8	90.8
Observations	1,527	1,526	1,506	1,506

Standard errors clustered by family; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Sample is all peer heir's first wives who married between 1650-1882.

▸ Probit ▸ Number of births

Selection in OLS



Instrumental variables

First stage:

$$m_{i,d} = \sum_{n=2}^{15} \delta_n \mathbb{I}(r_{i,d} = n) + \delta_z Z_{i,d} + \mu_d + \mathbf{X}'_{i,d}\gamma + \epsilon_{i,d}$$

- $r_{i,d}$ is the **birth order** of individual i.
- $Z_{i,d}$ age at death of i's father.
- μ_d are marriage decade fixed effects.
- $\mathbf{X}$: social status, age at marriage (wife), age at death, and stillbirths in the family.

Second stage:

$$\chi_{i,j,b,d} = \delta \hat{m}_{i,j,b,d} + \mu_j + \mu_b + \mu_d + \mathbf{X}'_{i,j,b,d}\gamma + \epsilon_{i,j,b,d}$$

First stage

Dep. Variable: Father is alive at his heir's wedding

		coef	se
Birth order:	1st	reference	
	2nd	-0.040	(0.025)
	3rd	-0.101***	(0.029)
	4th	-0.119***	(0.036)
	5th	-0.127***	(0.043)
	6th	-0.152***	(0.055)
	7th	-0.168**	(0.077)
	8th	-0.119	(0.085)
	9th	-0.155	(0.098)
	10th	-0.045	(0.093)
	11th	0.104	(0.263)
	12th	-0.141	(0.213)
	13th	0.220	(0.262)
	15th	0.421	(0.367)
	Controls	YES	
	Marriage decade FE	YES	
	F test	39.18	
	% correctly predicted	74.9	
	Observations	1,530	

Controls: age at death of the father, social status (wife & husband), age at marriage (wife), age at death (both), stillbirths (hus. family);
Sample is all peers who married between 1650 and 1882;
Standard errors clustered by family in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

no selection in IV

Second stage

Dep. Variable: Childlessness

	OLS	IV
Settlement	-0.084**	-0.151***
[i.e., father died after wedding]	(0.036)	(0.036)
Number of siblings	-0.004	-0.002
	(0.005)	(0.004)
Father-in-law is a duke	-0.047	-0.045
	(0.051)	(0.036)
Wife's age at marriage	0.013***	0.012***
	(0.004)	(0.003)
Wife's age at death	-0.000	-0.000
	(0.001)	(0.001)
Husband's age at death	-0.004***	-0.004***
	(0.001)	(0.001)
Still to live births (family)	1.624***	1.645***
	(0.613)	(0.424)
Wife's social status	YES	YES
Family FE	YES	YES
Birth year FE	YES	YES
Marriage decade FE	YES	YES
% correctly predicted	90.8	91.0
Observations	1,505	1,505

Sample is all peer heirs' first wives who married between 1650 and 1882; Standard errors clustered by family in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

IV2

Test for the exclusion restriction

Dep. Var.: Childlessness

	benchmark	non-heirs	England and Ireland	Scotland
Settlement	-0.151***	0.035	-0.161***	0.011
[i.e., father died after wedd.]	(0.036)	(0.054)	(0.054)	(0.084)
Ho:	-	$\delta(1) = \delta(2)$	-	$\delta(3) = \delta(4)$
prob $>$ chi2	-	8.06***	-	2.98*
Controls	YES	YES	YES	YES
Family FE	YES	YES	YES	YES
Birth year FE	YES	YES	YES	YES
Marriage decade FE	YES	YES	YES	YES
Father-in-law status	-	YES	-	-
F-stat from first stage	39.18	37.05	30.60	12.12
% correctly predicted	90.8	53.7	89.2	54.4
Observations	1,505	1,565	1,165	365

Controls are number of siblings (husband), social status (wife & husband), age at marriage (wife), age at death (both spouses), stillbirths (husband's family);
Standard errors clustered by family in parentheses; *** p$<$0.01, ** p$<$0.05, * p$<$0.1.

Robustness: inheritance at majority

> *the father might find it advantageous to bargain with his eldest son before a marriage was in immediate prospect to avoid the pressure of the bride's family.*
> *(Habakkuk 1950: p. 26)*

Alternative proxy for signing a settlement: father died after the heir turned 21.

Settlements did not incorporate the interests of the bride's family concerning family provisions in case she became a widow.

The effect of settlements on childlessness is due to the entailment motive of these contracts.

▸ results

Road map

1. Introduction
2. Hollingsworth dataset
3. Empirical analysis
4. Model
5. Summary

Set up

OLG model - 3 generations of a same dynasty, $i = \{1, 2, 3\}$.

Each generation makes decisions regarding:

- fertility, $n_i = \{0, 1\}$,
- consumption, x_i,
- bequests to the next generation(s), b_{i+1}.

Dynastic structure:

- The dynasty is endowed a fixed wealth K (e.g., land).
- Hyperbolic discounting preferences.
- If $n_i = 0$, the dynasty becomes extinct at $i + 1$.

Decision problem: generation $i = 1$

- Payoffs:

$$\ln(x_1) + n_1 \; \left[\beta\delta \ln(x_2) + n_2 \; \beta\delta^2 \ln(x_3)\right].$$

- Budget constraint:

$$K = x_1 + k_2.$$

- discount function

Decision problem: generation $i = 2$

- Payoffs:

$$\ln(x_1) + n_1 \left[\beta\delta \ln(x_2) + n_2\, \beta\delta^2 \ln(x_3)\right].$$

- Budget constraint:

$$\boldsymbol{k_2} = x_2 + k_3.$$

Decision problem: generation $i = 3$

- Payoff:

$$\ln(x_1) + n_1 \left[\beta\delta \ln(x_2) + n_2 \; \beta\delta^2 \ln(x_3)\right].$$

- Budget constraint:

$$\boldsymbol{k_3} = x_3.$$

Model without commitment

- Each generation i decides fertility (n_i) and consumption (x_i).
- Each generation i decides the bequests to the next generation (k_{i+1}).

Proposition (Fertility without commitment)

1. *Generation $i = 3$ will never have children ($n_3 = 0$).*

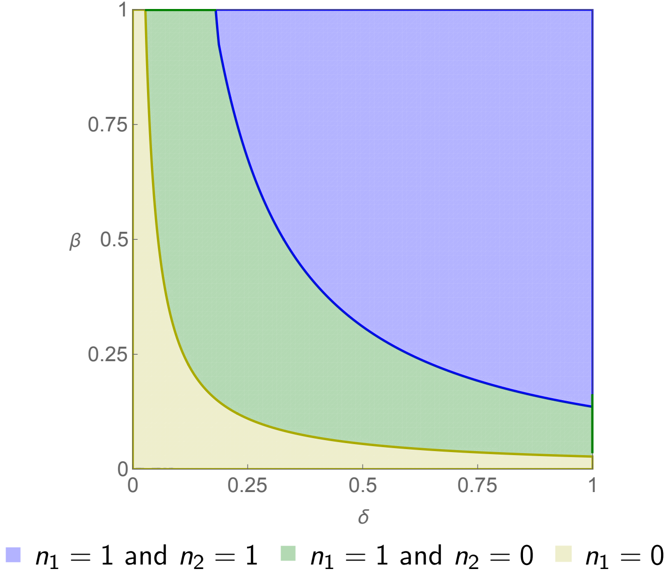
2. *Generation $i = 2$ will have children ($n_2 = 1$) if and only if:*

$$f(k_2) := v_2\left(x_2{=}\frac{k_2}{1+\beta\delta}, x_3{=}\frac{\beta\delta\ k_2}{1+\beta\delta}, n_2{=}1\right) - v_2(x_2{=}k_2, x_3{=}0, n_2{=}0) > 0.$$

3. *Generation $i = 1$ will have children ($n_1 = 1$) if and only if:*
   - $v_1(x_1^*, x_2^*, x_3 = 0, n_1 = 1, n_2 = 0) > v_1(x_1 = K, x_2 = 0, x_3 = 0, n_1 = 0, n_2 = 0)$, *when* $f(k_2^*) < 0$, *or*
   - $v_1(x_1^{**}, x_2^{**}, x_3^{**}, n_1 = 1, n_2 = 1) > v_1(x_1 = K, x_2 = 0, x_3 = 0, n_1 = 0, n_2 = 0)$ *when* $f(k_2^{**}) > 0$.

consumption

Fertility at equilibrium (K given)



Model with commitment

- Each generation i decides fertility (n_i) and consumption (x_i).
- **Generation $i = 1$ decides all bequests (k_2 and k_3).**

Proposition (Fertility with commitment)

1. *Generation $i = 3$ will never have children ($n_3 = 0$).*

2. *Generation $i = 2$ will have children ($n_2 = 1$) if and only if:*

$$\mathcal{F}(k_2, \boldsymbol{k_3}) := v_2\left(x_2 = k_2, x_3 = \boldsymbol{k_3}, n_2{=}1\right) \\ - v_2(x_2 = k_2, x_3 = 0, n_2 = 0) > 0.$$

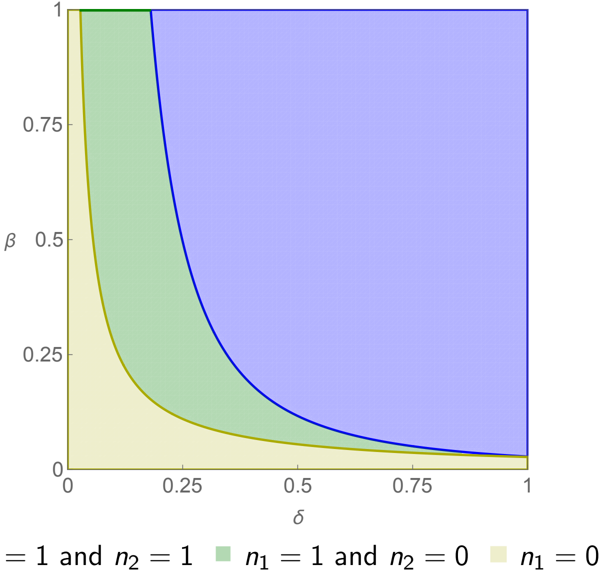
3. *Generation $i = 1$ will have children ($n_1 = 1$) if and only if:*

   - $v_1(x_1^*, x_2^*, x_3 = 0, n_1 = 1, n_2 = 0) > v_1(x_1 = K, x_2 = 0, x_3 = 0, n_1 = 0, n_2 = 0)$, *or*

   - $v_1(x_{1c}^{**}, x_{2c}^{**}, x_{3c}^{**}, n_1 = 1, n_2 = 1) > v_1(x_1 = K, x_2 = 0, x_3 = 0, n_1 = 0, n_2 = 0)$ *when* $\mathcal{F}(k_2^{**}, k_3^{**}) > 0$.

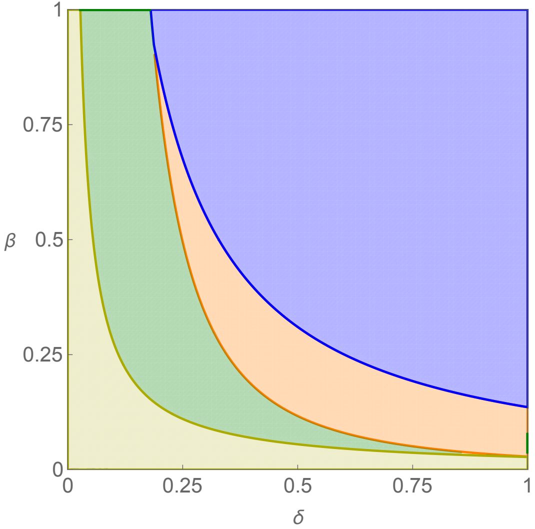
▸ consumption

Fertility at equilibrium (K given)



Comparison of the models with and without commitment

The effect of settlements on fertility (K fixed)



$n_1 = 1,\ n_2 = 0$ in NC

$n_1 = 1,\ n_2 = 1$ in C

Welfare

In the parameter region where generation $i = 2$ is childless in the model without commitment and has children in the model with commitment, all generations are better off:

- $v_3(x_{3c}^{**}) > v_3(x_3 = 0)$,
- $v_2(x_{2c}^{**}, x_{3c}^{**}, n_2{=}1) > v_2(x_2^{*}, x_3{=}0, n_2{=}0)$,

  a larger share of wealth trickles down from generation 1: $k_{2c}^{**}, k_{3c}^{**} > k_2^{*}$
- $v_1(x_{1c}^{**}, x_{2c}^{**}, x_{3c}^{**}, n_1{=}1, n_2{=}1) > v_1(x_1^{*}, x_2^{*}, x_3{=}0, n_1{=}1, n_2{=}0)$

  solves the problem of inter-generational time inconsistency.

→ supports why settlements have remained for such a long period in time.

Road map

Summary

Settlements increased the probability of having children for the heir's wives by 15 percentage points.

- Data for c. 1,500 peers and their offspring (1650–1882).
- Identification using exogenous variation in birth order.

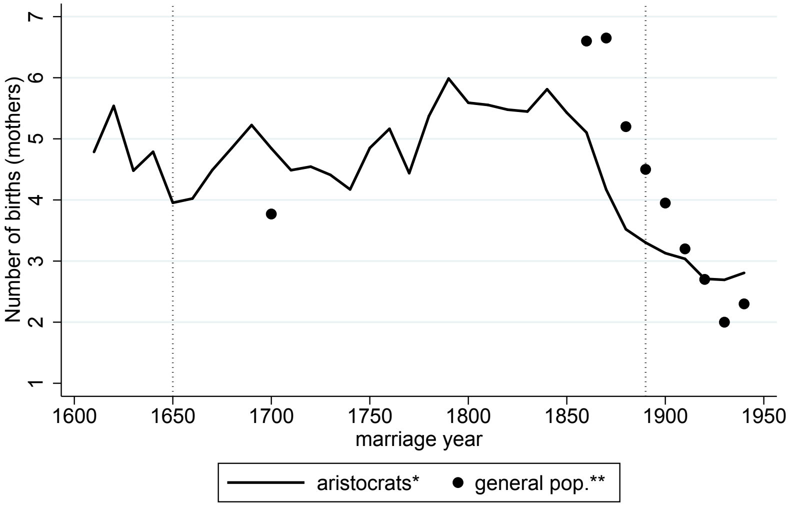
Simple model with hyperbolic discounting across generations:

- can explain the effect of settlements on childlessness,
- rationalizes the existence of settlements,
- but more in general, crucial for inheritance rules that tie the hands of proprietors.

Positive relation between inequality and the extensive margin of fertility.

Back up slides

Fertility of mothers in the elite



* sample: married women whose father is a peer

** sources: Wrigley et al (1997), Galor (2011)

back

Surviving children

* sample: married women whose father is a peer

* sample: married women whose father is a peer

back

Comparison with other nobilities

	Childlessness				
	1650-99	1700-49	1750-99	1800-49	1850-99
Henry and Lévy (1960)[a] *Ducs et Pairs de France*	9% (N=34)	21% (N=24)	35% (N=20)	-	-
Pedlow (1982)[b] Nobility of Hesse-Kassel	5% (N=39)	14% (N=51)	9% (N=56)	8% (N=121)	8% (N=84)
Hollingsworth (1964)[a] (dukes only)	12% (N=122)	18% (N=115)	17% (N=138)	12% (N=146)	8% (N=166)
Hollingsworth (1964)[a] (all peers)	14% (N=218)	18% (N=192)	16% (N=217)	12% (N=281)	9% (N=308)

Notes: The sample are: *a*) women marrying before 20 years old for whom the marriage did not break because either she or the spouse died before 45 years old; *b*) for whom the marriage did not break because either she or the spouse died before 45 years old.

back

Examples

Settlement

Father: Robert Brudenell, 2nd Earl of Cardigan (died in 1703)
Heir: Francis Brudenell, Lord Brudenell (married in 1668)

> *Robert, second Earl of Cardigan, strictly settled the Brudenell estates in 1668 on the marriage of his eldest son with Frances, daughter of the Earl of Sussex. (Habakkuk 1994: p. 19)*

No settlement

Father: William Craven, 6th Baron Craven (died in 1791)
Heir: William Craven, 1st Earl of Craven (married in 1807)

> *The sixth Lord Craven, whose principal estates had been settled on his marriage in 1767, died on 26 September 1791. The eldest son came of age on 1 September [and he did not marry until 1807]. There was no time for a resettlement [...]. He married in December 1807, at the advanced age of 37, a celebrated actress, Louisa Brunton [...]. (Habakkuk 1994: p. 45, 46)*

back

Inheritance

Heirs received all the land, younger brothers and sisters received an allowance.

Settlements:

- Signed upon the marriage of the heir
- The heir committed to pass the estate unbroken to the next generation in exchange for an anticipation
- *De facto* entailment
- Also settled dowries and allowances.
- Between 1650 and 1882

Historical background

Before 1650,

- marriage settlements were mainly used to settle a provision for widows.
- marriage settlements could not be used to entail the land because they were easy to break.

Interregnum period, 1649 - 1660:

- Trustees to defend the interest of the unborn son.
- Settlements to combat the threat of expropriation.

Settled Land Act, 1882:

- Possibility to sell the land. The money from the sale is settled.

back

Relevance of settlement

"... about one-half of the land of England was held under strict settlement in the mid-eighteenth century." (Habakkuk 1950)

"the full force of social convention and family custom ... [made it such that] ... only an unusually independent or unusually irresponsible young man ... would be able to stand up to such psychological pressures." (Stone and Stone 1984, p. 78)

back

Levenshtein distance

Definition

The Levenshtein distance between two words is the minimum number of single-character edits (i.e. insertions, deletions or substitutions) required to change one word into the other.

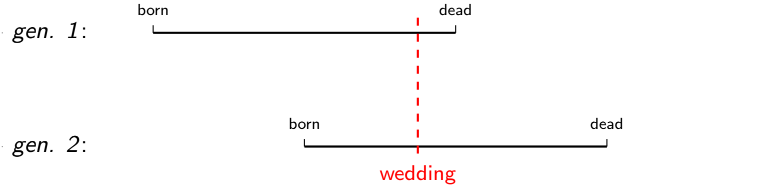
Example: “Lyttelton?” vs. “Lyttleton”

Lyttelton? → Lyttelton → Lyttleton

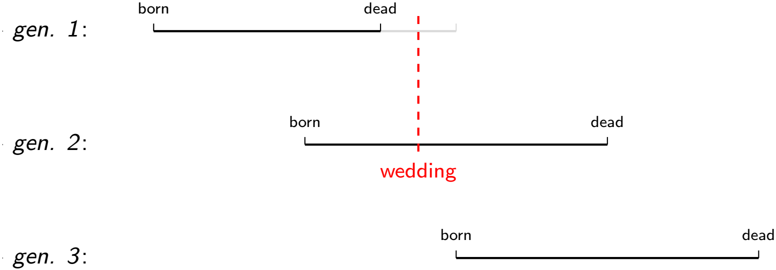
Levenshtein distance = 3.

back

Settlement is signed (m=1)



Settlement is not signed (m=0)



back

	Dep. variable: Childlessness					
	(1)		(2)		(3)	
	OLS	Probit	OLS	Probit	OLS	Probit
Settlement	-0.050***	-0.049***	-0.053***	-0.052***	-0.036**	-0.033*
[i.e., father died after wedding]	(0.019)	(0.018)	(0.019)	(0.018)	(0.018)	(0.018)
Husband's siblings (#)	-0.001	-0.000	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Father-in-law is a duke			0.022	0.023	0.021	0.021
			(0.019)	(0.019)	(0.018)	(0.018)
Wife's age at marriage					0.014***	0.012***
					(0.002)	(0.002)
Wife's age at death					0.000	0.000
					(0.000)	(0.000)
Husband's age at death					-0.003***	-0.003***
					(0.001)	(0.001)
Still to live births (fam)					0.174	0.161
					(0.311)	(0.233)
Wife's social status	NO	NO	YES	YES	YES	YES
Family FE	NO	NO	NO	NO	NO	NO
Birth year FE	NO	NO	NO	NO	NO	NO
Marriage decade FE	NO	NO	NO	NO	NO	NO
Observations	1,528	1,528	1,527	1,527	1,507	1,507
% correctly predicted	81.2	81.3	81.2	81.3	82.8	83.1

Standard errors clustered by family in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Marginal effects reported for Probit regressions.

back

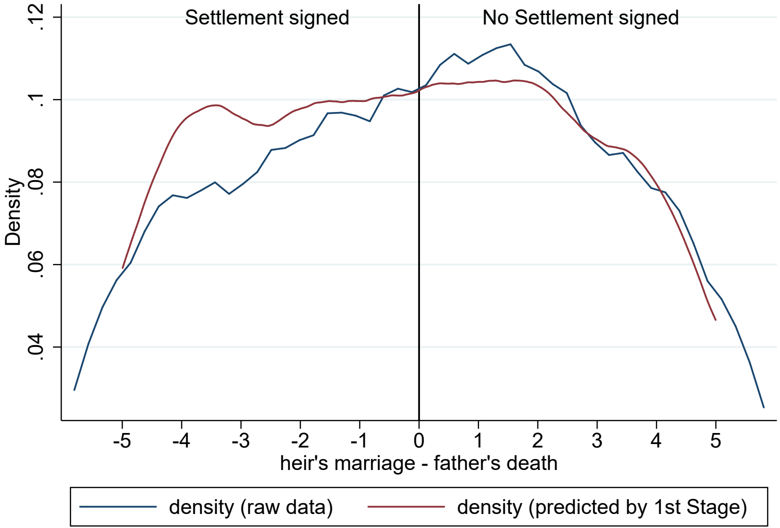
Dep. variable: All live births of mothers (poisson)

	(1)	(2)	(3)	(4)
Settlement	0.042	0.042	0.012	0.024
[i.e., father died after wedding]	(0.036)	(0.035)	(0.033)	(0.043)
Husband's siblings (#)	0.011**	0.011**	0.010**	-0.012*
	(0.005)	(0.004)	(0.004)	(0.006)
Father-in-law is a duke		0.046	0.028	0.037
		(0.037)	(0.035)	(0.082)
Wife's age at marriage			-0.032***	-0.024***
			(0.005)	(0.006)
Wife's age at death			0.000	0.002**
			(0.001)	(0.001)
Husband's age at death			0.012***	0.013***
			(0.001)	(0.002)
Still to live births (fam)			-0.379**	-10.406
			(0.193)	(7.524)
Family FE	NO	NO	NO	YES
Birth year FE	NO	NO	NO	YES
Marr. dec. FE	NO	NO	NO	YES
Observations	1,264	1,263	1,261	1,261

Standard errors clustered by family; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Sample is all peer heirs' first wives who married between 1650 and 1882.

back

No selection in IV



kernel = epanechnikov, bandwidth = 0.8080

back

Instrumental variables: number of daughters before the heir

First stage:

$$m_{i,d} = \sum_{n=2}^{8} \delta_n \mathbb{I}(r_{i,d} = n) + \delta_z Z_{i,d} + \mu_d + \mathbf{X}'_{i,d}\gamma + \epsilon_{i,d}$$

- $r_{i,d}$ is the **number of daughters born before** individual i.
- $Z_{i,d}$ age at death of i's father.
- μ_d are marriage decade fixed effects.
- $\mathbf{X}$: social status, age at marriage (wife), age at death, and stillbirths in the family.

Second stage:

$$\chi_{i,j,b,d} = \delta \hat{m}_{i,j,b,d} + \mu_j + \mu_b + \mu_d + \mathbf{X}'_{i,j,b,d}\gamma + \epsilon_{i,j,b,d}$$

First stage

Dep. Variable: Father is alive at his heir's wedding

		coef	se
Number of daughters	0	reference	
	1	-0.064***	(0.023)
	2	-0.111***	(0.029)
	3	-0.080**	(0.040)
	4	-0.126**	(0.060)
	5	-0.179***	(0.074)
	6	-0.225**	(0.108)
	7	0.102	(0.153)
	8	-0.158	(0.185)
	Controls	YES	
	Marriage decade FE	YES	
	F test	45.83	
	% correctly predicted	75.0	
	Observations	1,532	

Controls: age at death of the father, social status (wife & husband), age at marriage (wife), age at death (both), stillbirths (hus. family); Sample is all peers who married between 1650 and 1882; Standard errors clustered by family in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Second stage

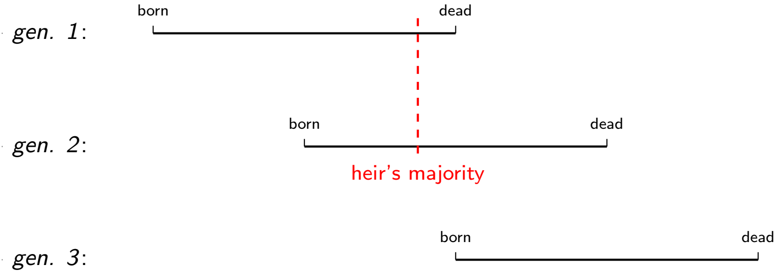
Dep. Variable: Childlessness

	OLS	IV
Settlement	-0.084**	-0.154***
[i.e., father died after wedding]	(0.036)	(0.037)
Number of siblings	-0.004	-0.002
	(0.005)	(0.004)
Father-in-law is a duke	-0.047	-0.043
	(0.051)	(0.036)
Wife's age at marriage	0.013***	0.012***
	(0.004)	(0.003)
Wife's age at death	-0.000	-0.000
	(0.001)	(0.001)
Husband's age at death	-0.004***	-0.004***
	(0.001)	(0.001)
Still to live births (family)	1.624***	1.632***
	(0.613)	(0.423)
Wife's social status	YES	YES
Family FE	YES	YES
Birth year FE	YES	YES
Marriage decade FE	YES	YES
% correctly predicted	90.8	90.8
Observations	1,505	1,532

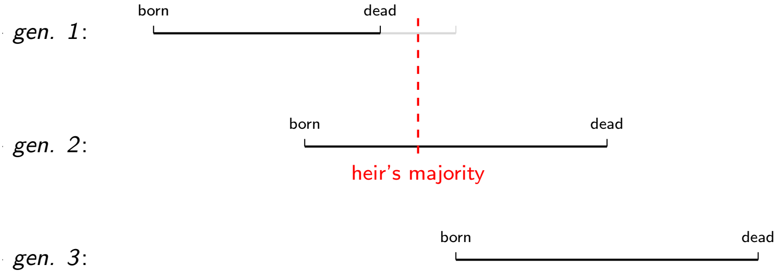
Sample is all peer heirs' wives who married between 1650 and 1882; Standard errors clustered by family in parentheses; *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

back

Alternative proxy: settlement is signed (m=1)



Alternative proxy: settlement is not signed (m=0)



Robustness: inheritance at majority

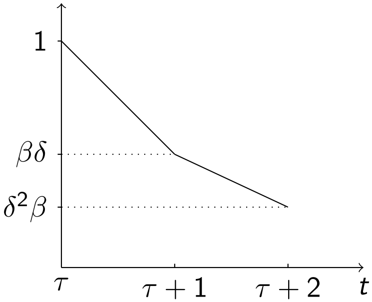
Dep. Var.:	Childlessness				All live births (if $>$ 0)
	heir's wives		non-heirs	Scotland	heir's wives
	OLS	IV	IV	IV	Poisson
Settlement	-0.080**	-0.153***	0.049	0.029	0.014
[i.e., father dies after majority]	(0.031)	(0.038)	(0.056)	(0.052)	(0.040)
Controls	YES	YES	YES	YES	YES
Family FE	YES	YES	YES	YES	YES
Birth year FE	YES	YES	YES	YES	YES
Marriage decade FE	YES	YES	YES	YES	YES
Father-in-law status	-	YES	-	-	-
Observations	1,700	1,727	1,714	433	1,418
% correctly predicted	89.8	89.8	57.5	63.1	-
F-stat from first stage	-	48.27	48.66	15.21	-

Notes: Samples: (1) & (2) all peer heirs' first wives who married between 1650 and 1882; (5) all peer heirs' first wives who married between 1650 and 1882 and had at least one birth in column; (3) and (4) first wives who were not exposed to settlements because they married a non-heir (col. 3) or a Scottish heirs (col. 4) between 1650 and 1882.
Controls: the number of siblings (husband), age at marriage (wife), age at death (both spouses), stillbirths (husband's family), social status (wife & husband);
Standard errors clustered by family in parentheses; *** p$<$0.01, ** p$<$0.05, * p$<$0.1.

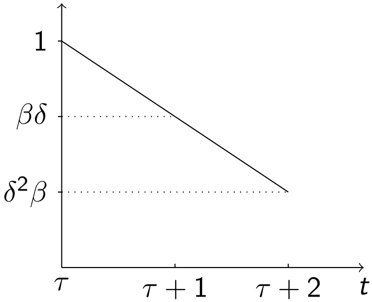
back

Quasi-hyperbolic discrete discount function

Low β



High β ($\beta \to 1$)



▸ back

Consumption without commitment

1. If $n_1 = 0$: $x_1 = K$.
2. If $n_1 = 1$ and $n_2 = 0$:
   - $x_1^* = \dfrac{K}{1+\beta\delta}$ and $x_2^* = \dfrac{\beta\delta\ K}{1+\beta\delta}$.
3. If $n_1 = 1$ and $n_2 = 1$:
   - $x_1^{**} = \dfrac{K}{1+\beta\delta+\beta\delta^2}$,
   - $x_2^{**} = \dfrac{1+\delta}{1+\beta\delta}\ \dfrac{\beta\delta\ K}{1+\beta\delta+\beta\delta^2}$, and
   - $x_3^{**} = \dfrac{\beta(1+\delta)}{1+\beta\delta}\ \dfrac{\beta\delta^2\ K}{1+\beta\delta+\beta\delta^2}$.

back

Consumption with commitment

1. If $n_1 = 0$: $x_1 = K$.
2. If $n_1 = 1$ and $n_2 = 0$:
   - $x_1^* = \dfrac{K}{1 + \beta\delta}$ and $x_2^* = \dfrac{\beta\delta\ K}{1 + \beta\delta}$.
3. If $n_1 = 1$ and $n_2 = 1$:
   - $x_{1c}^{**} = \dfrac{K}{1 + \beta\delta + \beta\delta^2}$,
   - $x_{2c}^{**} = \dfrac{\beta\delta\ K}{1 + \beta\delta + \beta\delta^2}$, and
   - $x_{3c}^{**} = \dfrac{\beta\delta^2\ K}{1 + \beta\delta + \beta\delta^2}$.

back