Climate Conditions and Fertility Decisions in Nineteenth-Century France

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Motivation

Fertility is a key determinant of economic development.

- A lot of literature on the factors that determine fertility choices.
- One important dimension is how climate change may effect fertility incentives in the future.
- Empirical research in this area is lacking.

This Paper

- Interesting case study to assess how fertility responds to climate conditions.
  - Large literature documenting how French people were adapting their fertility choices to economic incentives, beginning in the 18th century.
  - Large variation across French *départements*.
- I shed light on how climate change can affect fertility incentives.
  - Link adaptation to climate conditions in the agricultural sector to changes in fertility incentives.
  - Explore other effects of this adaptation, such as on marriage rates and gender-biased migration effects.

Figure 1: Dupré (1851-1910): "Milkmaids in the Field"

Results Overview

- I find that a one standard deviation increase in summer temperatures increase fertility by 4.5 percent.
- I also find that summer temperatures are associated with a lower amount of land devoting to pastoral farming and a lower female-male agricultural wage ratio.
- Using a heterogeneity analysis, I find these effects are larger in areas that began the period with more pastoral land (and were therefore more reliant on it for female employment).
- Higher summer temperatures also lead to higher female marriage rates for the youngest cohort and decrease the female-male sex ratio, suggesting changes in female migration.

19th Century French Agriculture

- In 1907 agriculture was 35% of GDP versus 6% for England.
- The average département had over 60% employed in agriculture in 1911.
- French farmers had a generally low desire to invest in human capital or to innovate (Weber, 1976).
- The main way farmers adapted to the market and the environment was through their land use (Price, 1988).
- The 'industrialisation' of French agriculture did not occur until well into the 20th century.

Pasture and Women's Work

- Women were dominant in pastoral farming in Europe at this time (Simonton, 2002; Schultz, 1985; Snell, 1981).
- This was also true of France (Segalan, 1983; Price, 1988)
- "Dairywork was seen as appropriate work for women as 'indoor' work...out of public view, unlike field work" (Simonton, 2002, p.123)
- Other papers have found gender-biased impacts of changes in pastoral (Schultz, 1985; Voigtlander and Voth, 2013; Ager *et al*, 2023)

Fertility Data

- Coale (1969) Fertility Index from Bonneuil (1997).
- Total fertility as a proportion of 'potential maximum' fertility given demographic structure.
- 5-year intervals 1851-1911, 81 départements, n = 1053.
- Used by Daudin et al., 2019; Bignon & García-Peñalosa, 2021; Murphy, 2015

Fertility Data

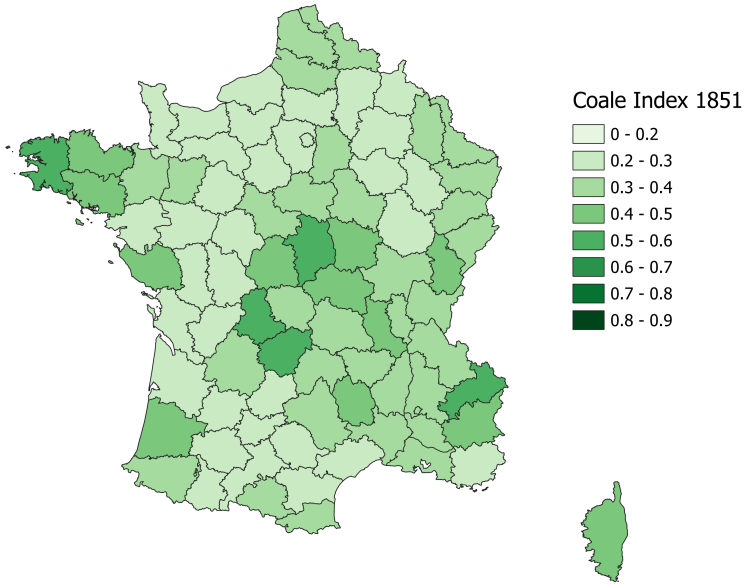

Figure 2: Fertility 1851

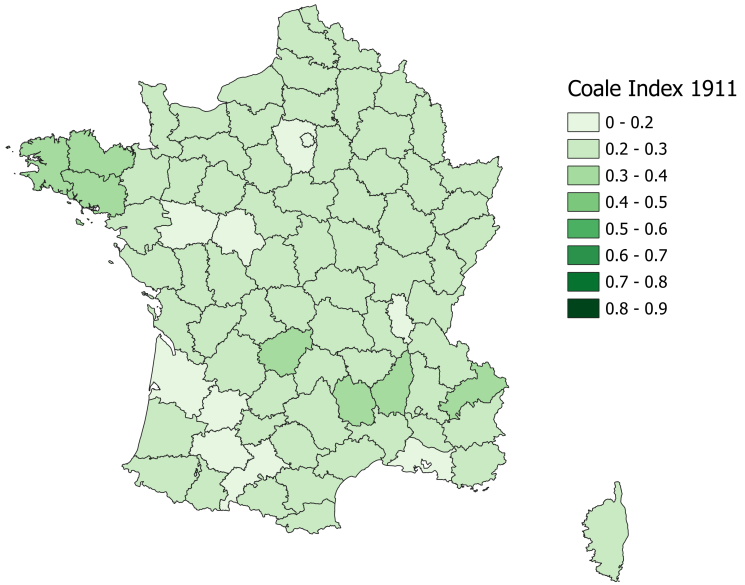

Figure 3: Fertility 1911

Climate Data

- Climate data comes from Luterbacher et al. (2004), Luterbacher et al. (2007), Xoplaki et al. (2005), and Pauling et al. (2006) (Seasonal averages).
- Used widely in the economic history literature including Waldinger (2022), Sequeira, Nunn & Qian (2019).
- Spatial averages based on historical department borders (Gay, 2020).

Empirical Framework

- Identification: Temperature deviations from a long run average (Deschênes & Greenstone, 2007).
- These deviations are exogenous and random (E. Blanc & Schlenker, 2017)
- Cui (2016) and Bleakley and Hong (2017) use longer averages, rather than individual years, for their deviations.
- Main independent variable for 1861 for department i:

$$SummerT_{(1856-1860)av_i} - SummerT_{(1821-1850)av_i}$$

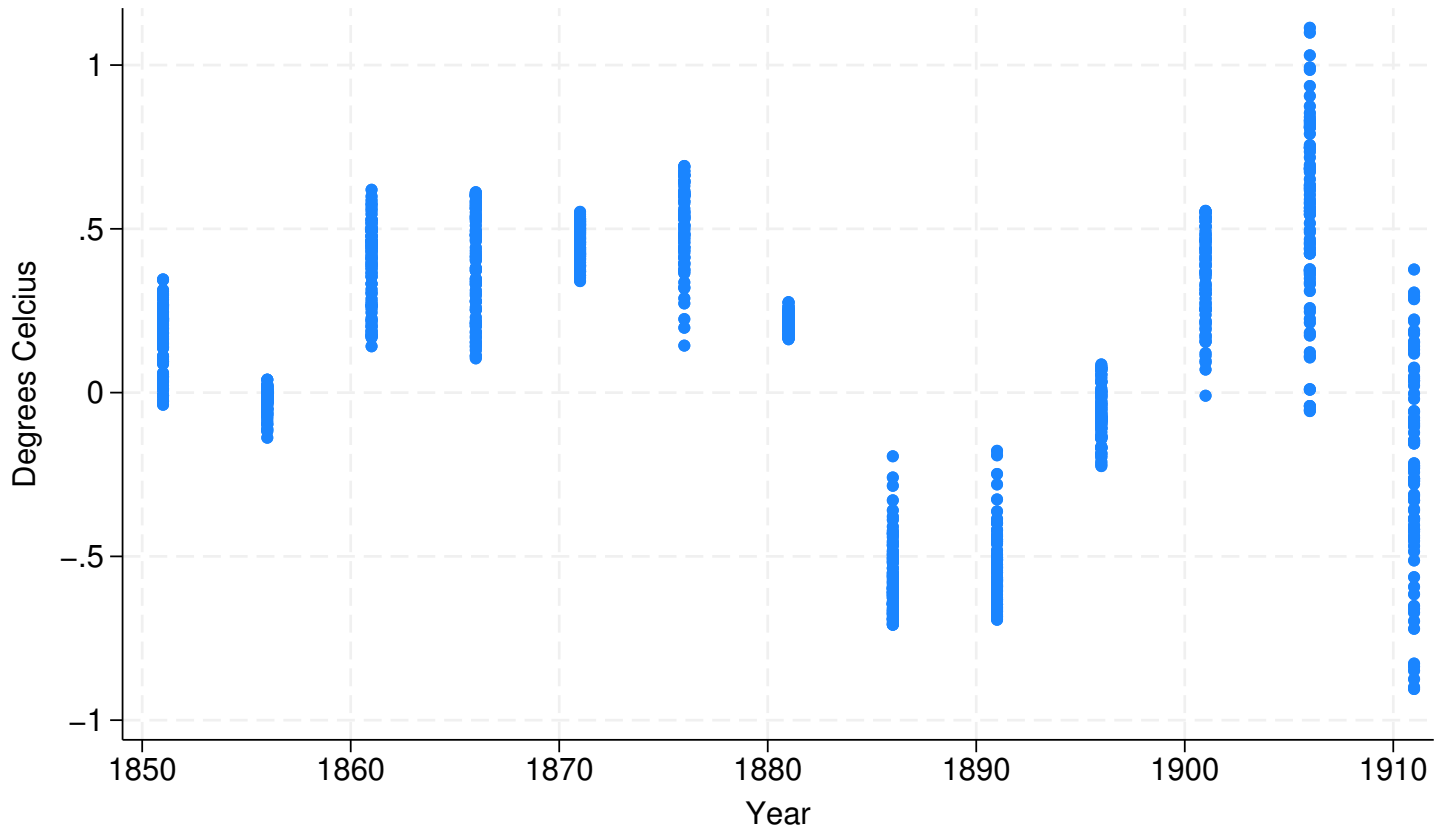

Figure 4: Summer Temperature Deviations 1851 - 1911

Empirical Framework

- Two-way fixed effects model:

$$I_{it}^{c} = \alpha + \beta_1 T_{it} + \gamma G_i x \theta_t + \phi_j X_{it} + H_{i,1861} x \theta_t + \mu_i + \theta_t + \epsilon_{it}$$

- I_{it}^{c}: Log Coale Fertility Index.
- T_{it}: 5 year Summer temperature deviation.
- $G_i x \theta_t$: Geographic controls by time fixed effects.
- X_{it}: Matrix of seasonal controls.
- $H_{i,1861} x \theta_t$: Historical controls in 1861 by time fixed effects
- Conley (2010) standard errors to adjust for spatial and serial autocorrelation (Murphy, 2015; Daudin et al., 2019)

Fertility

Table 1: Summer Temperature and Fertility

	Fertility			
	(1)	(2)	(3)	(4)
Summer Temperature	0.115	0.124	0.114	0.122
Standard Errors:				
Cluster by Department	(0.0294)***	(0.0339)***	(0.0480)**	(0.0349)***
Conley Standard Errors	(0.0339)***	(0.0348)***	(0.0495)**	(0.0313)***
Historical Controls	No	No	No	Yes
Seasonal Controls	No	No	Yes	Yes
Geographic Controls	No	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	1053	1053	1053	1040
Sample	1851-1911 by 5 Year Intervals			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in summer temperature is associated with a 4.5% increase in fertility.

Alternative Functional Forms

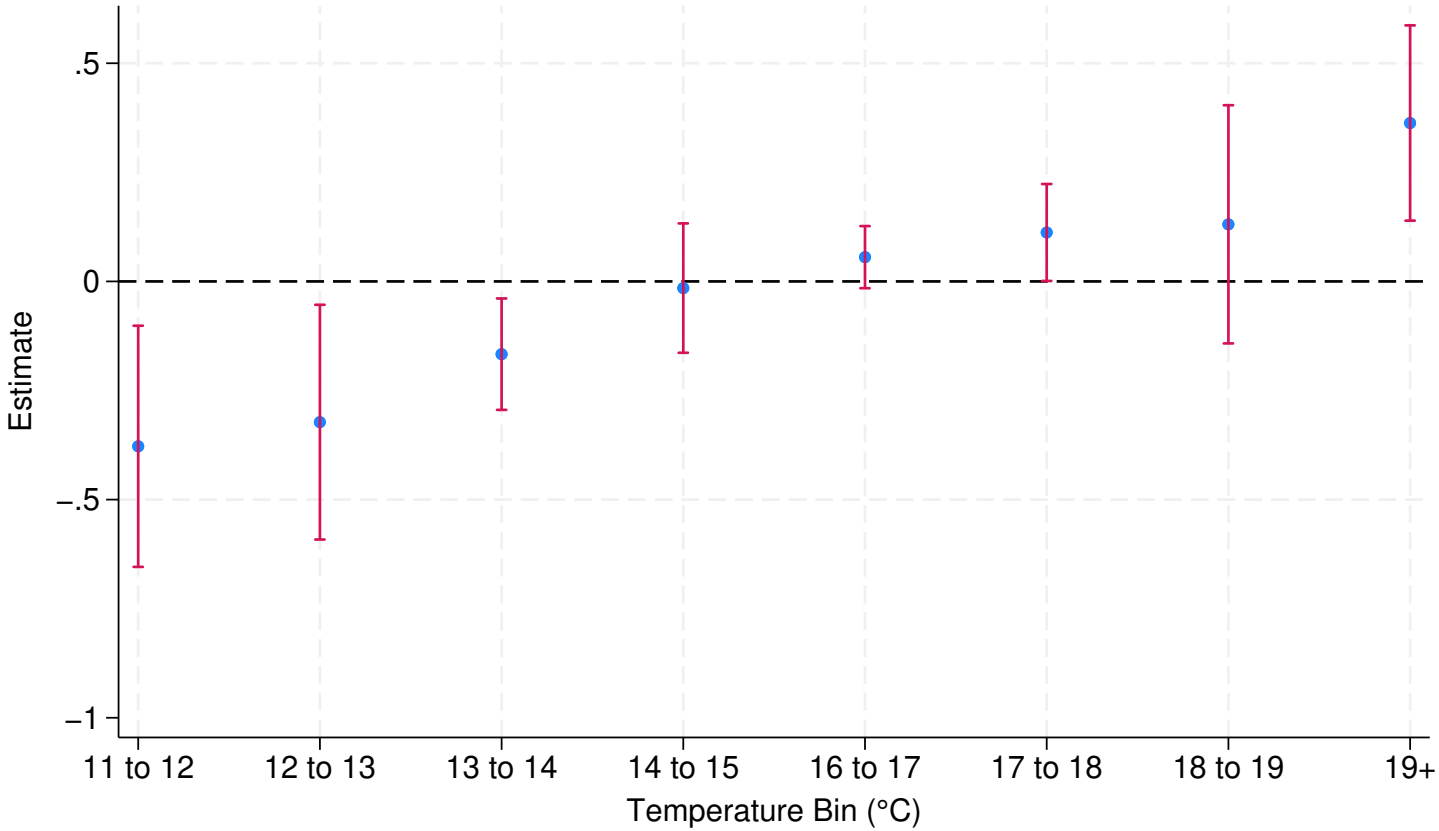

Figure 5: Fertility and Temperature Bins

Mechanism

- Data: 1852, 1862, 1882, and 1892 agricultural surveys.
- Land Analysis:

$$Land_{it}^{k} = \alpha + \beta_1 T_{it} + \beta_2 P_{it} + \beta_3 TotalLand_{it} + \mu_i + \theta_t + \epsilon_{it}$$

- Wage Analysis:

$$WageRatio_{it} = \alpha + \beta_1 T_{it} + \beta_2 P_{it} + \mu_i + \theta_t + \epsilon_{it}$$

Land Use

Table 2: The Relationship between Summer Temperature and Land Use

	Pasture Land		Tillage Land		Vineyard Land	
	(1)	(2)	(3)	(4)	(5)	(6)
Summer Temperature	-333.54	-277.37	-3.49	213.58	56.04	60.84
Standard Errors:						
Cluster by Department	(49.51)***	(41.29)***	(53.78)	(46.06)***	(21.85)**	(21.56)***
Conley Standard Errors	(38.99)***	(38.90)***	(86.16)	(41.68)***	(25.93)**	(29.37)**
Total Agricultural Land	No	Yes	No	Yes	No	Yes
Summer Precipitation	Yes	Yes	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	324	324	324	324	324	324
Sample	1851, 1861, 1881 & 1891					

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in summer temperatures decreases pastoral land by 136,000 hectares and increases vineyards by 21,000 hectares. The effect on tillage land is only relative to total agricultural land

Women's Wages

Table 3: The Relationship between Summer Temperature and Wage Ratios

	No Food		Food	
	Winter	Summer	Winter	Summer
Summer Temperature	-0.417	-0.252	-1.746	-0.020
Standard Errors:				
Cluster by Department	(0.182)**	(0.163)	(1.487)	(0.365)
Conley Standard Errors	(0.089)***	(0.093)***	(1.162)	(0.252)
Summer Precipitation	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	162	162	162	162
Sample	1881 & 1891			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in summer temperatures reduces the female-male wage (No food) ratio by 16% and 9.5% for winter and summer wages, respectively.

Heterogeneity Analysis

- How pastoral land at the beginning of the period affects the relationship between summer temperatures and fertility.
- Assumption: More pastoral land means that women were more reliant on pasture for employment at the beginning of the period and therefore more vulnerable to summer temperature shocks (and falls in pastoral production).

$$I_{it}^{c} = \alpha + \beta_1 T_{it} + \beta_2 Pasture_{i,1851} x T_{it} + \gamma G_i x \theta_t + \phi_j X_{it} + \mu_i + \theta_t + \epsilon_{it}$$

- Main estimate of Interest: β_2

Heterogeneity Analysis: Fertility

Table 4: Heterogeneity Analysis: Fertility

	Fertility		
	(1)	(2)	(3)
Summer Temperature	0.259	0.694	0.658
	(0.094)***	(0.227)***	(0.266)**
Summer Temperature x Pasture_{1851}	0.010	0.010	0.011
Standard Errors:			
Cluster by Department	(0.004)***	(0.004)***	(0.003)***
Conley Standard Errors	(0.002)***	(0.002)***	(0.002)***
Geographic Controls	No	No	Yes
Seasonal Controls	No	Yes	Yes
Total Agricultural Land	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	324	324	324
Sample	1851, 1861, 1881, & 1891		

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in the amount of pastoral land in 1851 increases the impact of summer temperatures on fertility by between 7.6 and 9.3 percentage points.

Conclusion

- I find that summer temperatures have a significant, positive impact on fertility
- I also find evidence that this is through climate adaptation in the agricultural sector, which reduces employment opportunities for women and the opportunity cost of having children.
- Higher summer temperatures increase marriage rates, while also altering female migration patterns.

Marriage Rates

Table 5: Summer Temperature and Marriage Rates

	Marriage Rates (Female 20-24)			
	(1)	(2)	(3)	(4)
Summer Temperature	0.068	0.061	0.083	0.082
Standard Errors:				
Cluster by Department	(0.015)***	(0.018)***	(0.019)**	(0.024)***
Conley Standard Errors	(0.020)***	(0.024)**	(0.039)**	(0.040)**
Historical Controls	No	No	No	Yes
Seasonal Controls	No	No	Yes	Yes
Geographic Controls	No	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	480	480	480	480
Sample	1861-1911 by 10 Year Intervals			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in summer temperature is associated with between a 2 and 3 percentage point increase in the marriage rate.

Migration

Table 6: Summer Temperature and Sex Ratios

	Population Sex Ratio			
	(1)	(2)	(3)	(4)
Summer Temperature	-0.016	-0.029	-0.035	-0.029
Standard Errors:				
Cluster by Department	(0.007)**	(0.009)***	(0.010)***	(0.011)***
Conley Standard Errors	(0.004)***	(0.006)***	(0.006)***	(0.006)***
Historical Controls	No	No	No	Yes
Seasonal Controls	No	No	Yes	Yes
Geographic Controls	No	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	480	480	480	480
Sample	1861-1911 by 10 Year Intervals			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in summer temperature is associated with between a 0.6 and 1.4 percentage point decrease in the female-male sex ratio.

Marriage and Migration Data

- Daudin et al., 2019.
- Constructed from the 'TRA' dataset.
- Marriage rates: Women 20-24.
- Main variable for migration by sex: Sex Ratio
- 10-year intervals 1861-1911, 80 départements, n = 480.

The Coale Index

Coale (1969) Fertility Index from Bonneuil (1997):

$$I_f = \frac{(\Sigma_i F_{it} * W_{it})}{(\Sigma_i H_i * W_{it})}$$

- W_{it} is the number of women in age group i in year t.
- F_{it} is the childbearing rate among women in the ith age interval in year t.
- H_i is the rate of childbearing for the Hutterites.
- Total fertility as a proportion of 'potential maximum' fertility given demographic structure.
- 5-year intervals 1851-1911, 81 départements, n = 1053.
- Used by Daudin et al., 2019; Bignon & García-Peñalosa, 2021; Murphy, 2015

Heterogeneous Treatment Effects

Recent literature has pointed out the problems with TWFE models with heterogeneous treatment effects and negative weights (De Chaisemartin & D'Haultfoeuille, 2023). I correct for this using the estimator from De Chaisemartin et al. (2024) for settings with 'no-stayers'.

Table 7: Heterogeneous Treatment Effects with No Stayers

	Fertility			
	(1)	(2)	(3)	(4)
	1851-1856	1876-1881	1886-1891	1901-1906
Summer Temperature	0.840	-1.404	0.861*	0.064***
	(1.022)	(1.328)	(0.445)	(0.021)
Département Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	162	162	162	162

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

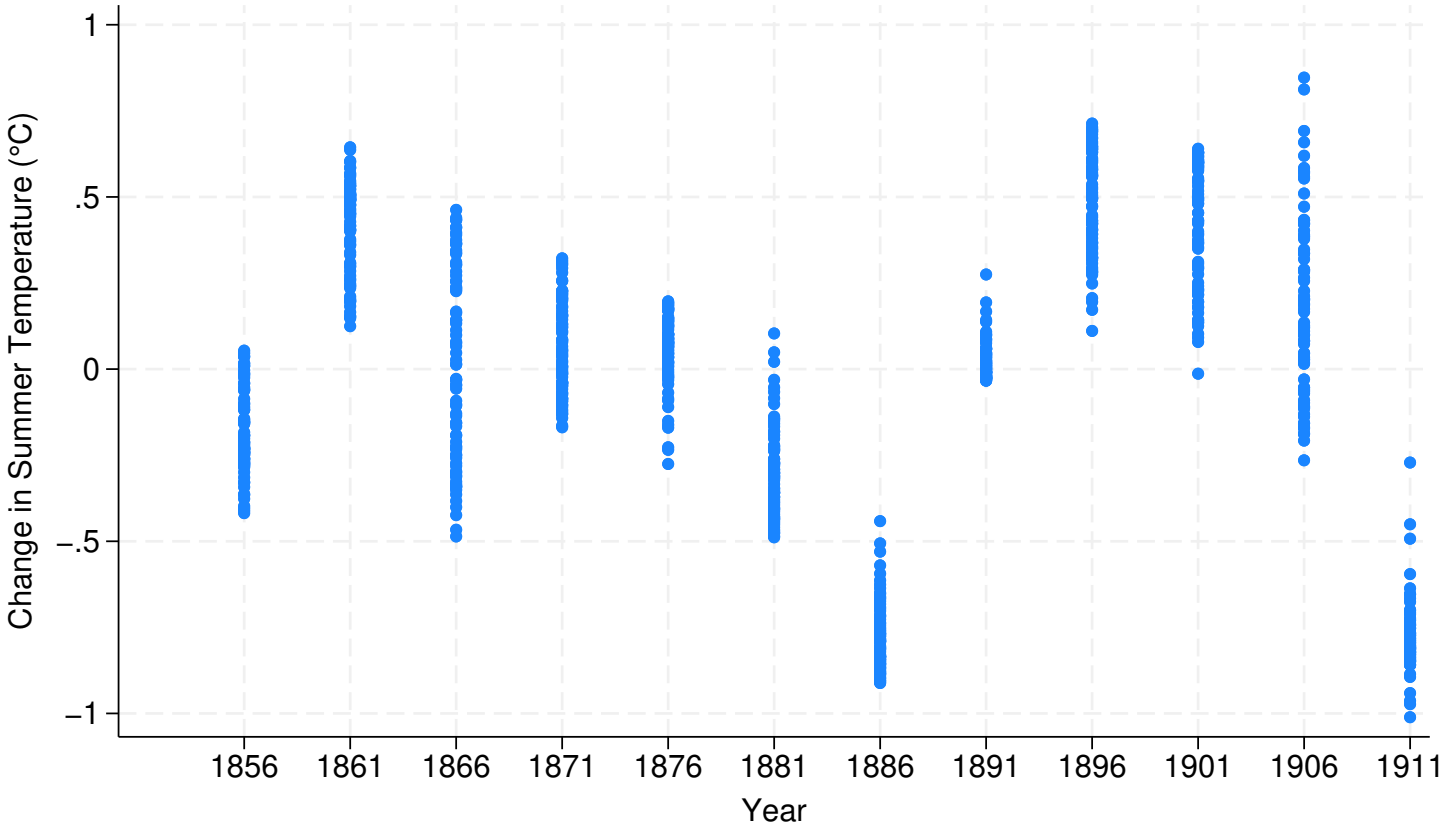

Figure 6: Change in Summer Temperature Deviations

Female Migration

Table 8: Female Migration

	Net Emigration (1)	Emigration (2)	Immigration (3)
Summer Temperature	0.029	-0.009	-0.039
Standard Errors:			
Cluster by Department	(0.015)*	(0.007)	(0.013)***
Conley Standard Errors	(0.013)**	(0.006)*	(0.013)***
Seasonal Controls	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	480	480	480
Sample	1861-1911 by 10 Year Intervals		

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Descriptive Statistics

Table 9: Descriptive Statistics

	Mean	Std.Dev.	Min	Max	Obs
Summer Temperature Deviation (°C)	.123	.396	-.905	1.114	1053
Summer Precipitation Deviation (mm)	5.762	18.900	-52.364	60.172	1053
Coale Fertility Index	.283	.066	.160	.585	1053
Female Marriage Rates (20-24 Age Group)	.457	.143	.172	.899	480
Population Sex Ratio (Female-Male)	1.0175	.0415	.8045	1.1884	480

Note - Summer temperature and summer precipitation deviations are the average summer temperature and precipitation for the periods 1846-1850, 1851-1855, 1856-1860, and so on up to 1906-1910, relative to their department level average for 1821 to 1850. The Coale index is available at 5 year intervals from 1851 to 1911 while marriage rates and sex ratios are available from 1861 to 1911 at 10 year intervals. The Coale Fertility index is a measure of fertility relative to maximum potential fertility.

Fertility Lags

Table 10: Fertility Lags

	Fertility			
	(1)	(2)	(3)	(4)
Summer Temperature	0.115	0.067	0.064	0.087
	(0.029)***	(0.020)***	(0.022)***	(0.024)***
Fertility_{t-1}		0.517	0.490	0.453
		(0.056)***	(0.095)***	(0.100)***
Fertility_{t-2}			-0.017	-0.025
			(0.096)	(0.101)
Fertility_{t-3}				-0.041
				(0.075)
Summer Precipitation	Yes	Yes	Yes	Yes
Department Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	1053	972	891	810

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Temperature Lags

Table 11: Temperature Lags

	Fertility			
	(1)	(2)	(3)	(4)
Summer Temperature$_t$	0.115	0.084	0.085	0.094
	(0.029)***	(0.026)***	(0.025)***	(0.028)***
Summer Temperature$_{t-1}$		0.068	0.045	0.051
		(0.026)***	(0.025)*	(0.026)**
Summer Temperature$_{t-2}$			0.037	0.049
			(0.031)	(0.030)
Summer Temperature$_{t-3}$				-0.050
				(0.038)
Summer Precipitation$_t$	Yes	Yes	Yes	Yes
Summer Precipitation$_{t-1}$	No	Yes	Yes	Yes
Summer Precipitation$_{t-2}$	No	No	Yes	Yes
Summer Precipitation$_{t-3}$	No	No	No	Yes
Department Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	1053	972	891	810

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Production

Table 12: Production

	Value per Hectare					Value per Cow
	Wheat	Barley	Rye	Oats	Wine	Milk
	(1)	(2)	(3)	(4)	(5)	(6)
Summer Temperature	-0.086	0.108	-0.283**	0.142	1.377***	-0.757**
	(0.189)	(0.195)	(0.119)	(0.177)	(0.416)	(0.336)
Land Control	Yes	Yes	Yes	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	324	324	324	324	285	162
Sample	1851, 1861, 1881, & 1891					1881 & 1891

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Controlling for Wine Returns

Table 13: Controlling for Wine Returns

	Fertility		
	(1)	(2)	(3)
Summer Temperature	0.186*	0.576**	0.548**
	(0.103)	(0.272)	(0.252)
Summer Temperature x Pasture_{1851}	0.006*	0.007*	0.009**
	(0.003)	(0.004)	(0.001)
Wine Returns	-0.013	-0.003	0.000
	(0.024)	(0.027)	(0.028)
Geographic Controls	No	No	Yes
Seasonal Controls	No	Yes	Yes
Total Agricultural Land	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	284	284	284
Sample	1851, 1861, 1881, & 1891		

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Marriage Rates: 25-29

Table 14: Marriage Rates: 25-29

	Marriage Rates (Female 25-29)			
	(1)	(2)	(3)	(4)
Summer Temperature	0.028	0.035	0.007	-0.004
Standard Errors:				
Cluster by Department	(0.013)**	(0.013)***	(0.019)	(0.021)
Conley Standard Errors	(0.017)	(0.020)*	(0.030)	(0.037)
Historical Controls	No	No	No	Yes
Seasonal Controls	No	No	Yes	Yes
Geographic Controls	No	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	480	480	480	480
Sample	1861-1911 by 10 Year Intervals			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Marriage Rates: 30-34

Table 15: Marriage Rates: 30-34

	Marriage Rates (Female 30-34)			
	(1)	(2)	(3)	(4)
Summer Temperature	0.012	0.028	0.024	0.014
Standard Errors:				
Cluster by Department	(0.015)	(0.013)**	(0.016)	(0.018)
Conley Standard Errors	(0.016)	(0.016)*	(0.023)	(0.014)
Historical Controls	No	No	No	Yes
Seasonal Controls	No	No	Yes	Yes
Geographic Controls	No	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	480	480	480	480
Sample	1861-1911 by 10 Year Intervals			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Fertility Sub-Periods

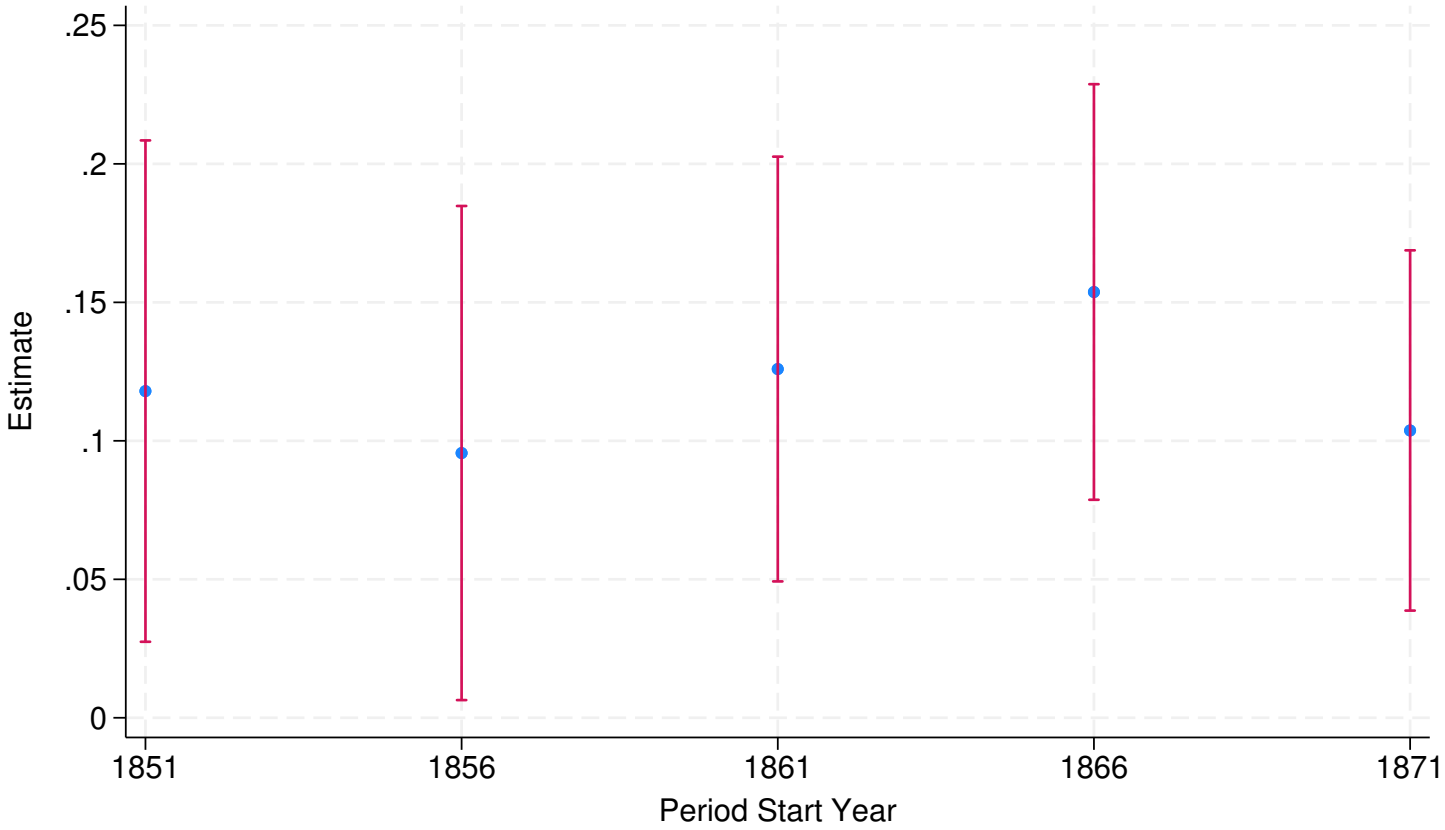

Figure 7: Summer Temperature and Fertility: Rolling 40 Year Periods

Heterogeneity Analysis: Marriage Rates

Table 16: Heterogeneity Analysis: Marriage Rates

	Marriage Rates		
	(1)	(2)	(3)
Summer Temperature	0.128	0.258	0.287
	(0.051)**	(0.116)**	(0.137)**
Summer Temperature x Pasture_{1851}	0.002	0.002	0.002
Standard Errors:			
Cluster by Department	(0.001)**	(0.001)**	(0.001)*
Conley Standard Errors	(0.001)***	(0.001)***	(0.001)***
Geographic Controls	No	No	Yes
Seasonal Controls	No	Yes	Yes
Total Agricultural Land	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	240	240	240
Sample	1861, 1881, & 1891		

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in the amount of pastoral land in 1851 increases the impact of summer temperatures on marriage rates by approx 1.7 percentage points.

Heterogeneity Analysis: Migration

Table 17: Heterogeneity Analysis: Migration

	Sex Ratio		
	(1)	(2)	(3)
Summer Temperature	-0.029	-0.174	-0.204
	(0.018)	(0.047)***	(0.053)***
Summer Temperature x Pasture_{1851}	-0.0001	-0.0007	-0.0007
Standard Errors:			
Cluster by Department	(0.0003)	(0.0005)	(0.0005)
Conley Standard Errors	(0.0002)	(0.0003)**	(0.0002)***
Geographic Controls	No	No	Yes
Seasonal Controls	No	Yes	Yes
Total Agricultural Land	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	240	240	240
Sample	1861, 1881, & 1891		

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in the amount of pastoral land in 1851 increases the impact of summer temperatures on sex ratios by approx 0.7 percentage points.

Long Differencing

Table 18: Summer Temperature and Fertility: Long Differencing

	Fertility			
	(1)	(2)	(3)	(4)
Summer Temperature	0.338	1.102	1.179	0.734
Standard Errors:				
Robust Standard Errors	(0.106)***	(0.306)***	(0.317)***	(0.295)**
Conley Standard Errors	(0.094)***	(0.163)***	(0.162)***	(0.044)***
Historical Controls	No	No	No	Yes
Seasonal Controls	No	No	Yes	Yes
Geographic Controls	No	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes
Observations	81	81	81	80

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A one SD increase in summer temperatures increases fertility by between 4.6 and 16 percent.

Conley Standard Errors

Table 19: Summer Temperature and Fertility: Conley Standard Errors

	Fertility				
	(200km)	(600km)	(800km)	(1000km)	(1200km)
Summer Temperature	0.122***	0.122***	0.122***	0.122***	0.122***
	(0.031)	(0.032)	(0.032)	(0.033)	(0.033)
Historical Controls	Yes	Yes	Yes	Yes	Yes
Seasonal Controls	Yes	Yes	Yes	Yes	Yes
Geographic Controls	Yes	Yes	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1040	1040	1040	1040	1040
Sample	1851-1911 by 5 Year Intervals				

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Controlling for Infant Mortality

Table 20: Summer Temperature and Fertility: Controlling from Infant Mortality

	Fertility		
	(1)	(2)	(3)
Summer Temperature	0.122***	0.122***	0.145**
	(0.031)	(0.044)	(0.058)
Infant Mortality	0.229***	0.220***	0.226***
	(0.030)	(0.028)	(0.028)
Geographic Controls	No	No	Yes
Seasonal Controls	No	Yes	Yes
Summer Precipitation	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	480	480	480
Sample	1861 to 1911 by 10 year Intervals		

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Full Seasonal Results

Table 21: Summer Temperature and Fertility: Full Results

	Fertility			
	(1)	(2)	(3)	(4)
Summer Temperature	0.115***	0.124***	0.114**	0.122***
	(0.0294)	(0.0339)	(0.048)	(0.035)
Autumn Temperature			0.098	0.021
			(0.074)	(0.056)
Winter Temperature			-0.028	0.070*
			(0.049)	(0.039)
Spring Temperature			0.042	-0.056
			(0.058)	(0.044)
Summer Precipitation	0.001**	0.000	-0.0001	0.000
	(0.0003)	(0.001)	(0.0005)	(0.001)
Autumn Precipitation			0.0001	-0.0005
			(0.0003)	(0.0003)
Spring Precipitation			-0.0000	-0.0001
			(0.0002)	(0.0004)
Historical Controls	No	No	No	Yes
Seasonal Controls	No	No	Yes	Yes
Geographic Controls	No	Yes	Yes	Yes
Summer Precipitation	Yes	Yes	Yes	Yes
Département Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Observations	1053	1053	1053	1040
Sample	1851-1911 by 5 Year Intervals			

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$