Jewish Persecutions and Weather Shocks: 1100-1800

Warren Anderson, Noel D. Johnson and Mark Koyama
njohnsoL@gmu.edu

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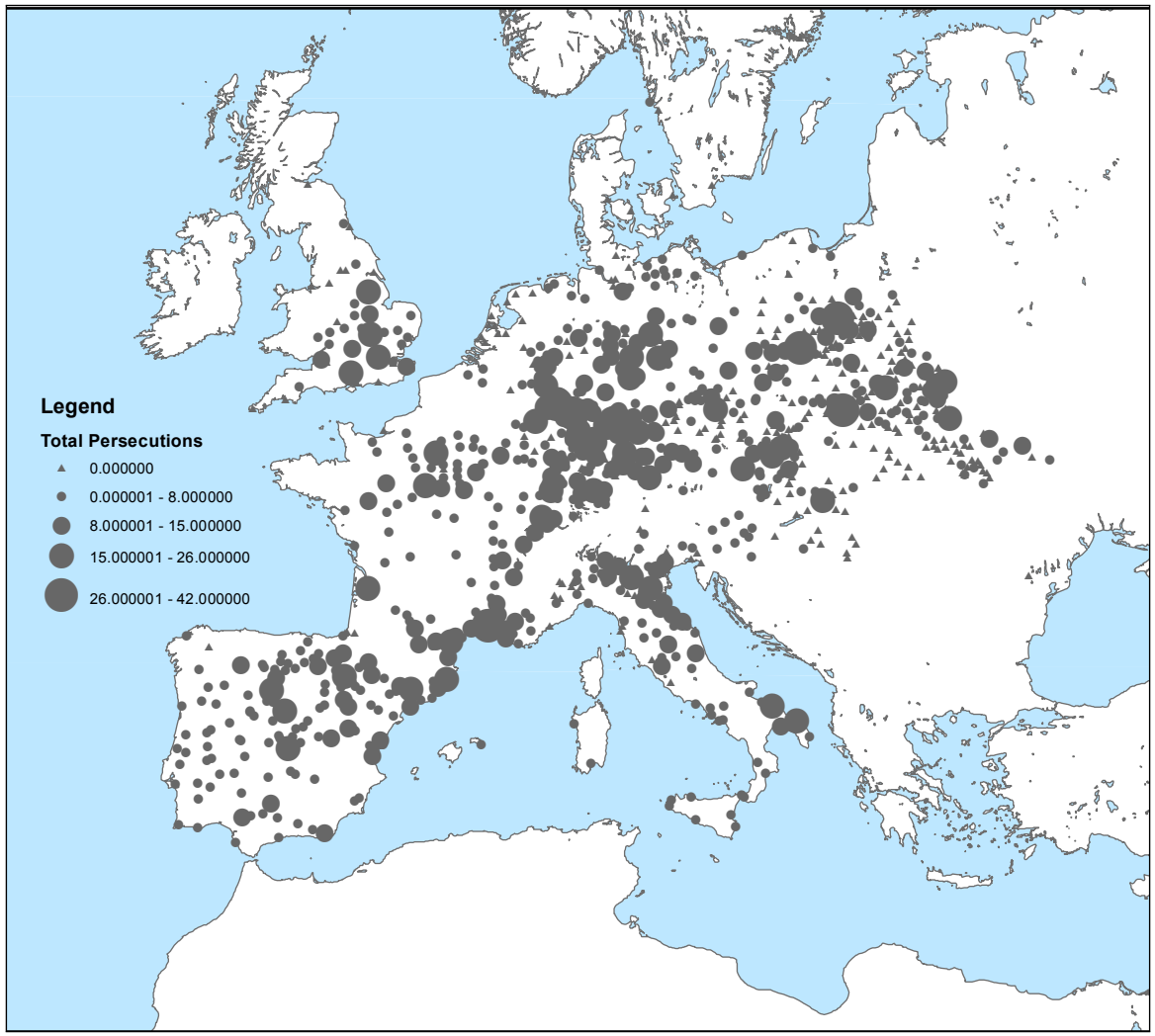
Climate, Government, and Religion?

- 'Three things exercise a constant influence over the minds of men: climate, government and religion.'

  –Voltaire *Essay on the customs and character of nations, and on the principal facts of history from Charlemagne to Louis XIII*

Voltaire wrote the accompanying quote to the Marquise du Châtelet.

Introduction: Jewish Cities & Persecution



Symbols are a Jewish city. Circles are Jewish cities with at least one persecution. Larger circles indicate more persecutions. Triangles are Jewish cities with no persecutions. Source: *Encyclopedia Judaica* (2007).

Introduction: Persecution or Toleration?

- We have data on 821 city-level expulsions and 545 'pogroms' from 936 European cities between 1100 and 1799 collected from the 26-volume Encyclopedia Judaica (2007).
- We have information on when Jews were accepted back into cities and countries (re-admittances).
- The temperature data are extracted from Guiot and Corona (2010) and are highly disaggregated (city level).
- Will corroborate the temperature shock results using rainfall data from 1500-1799 to show less rainfall also associated with more persecution.
- We will provide evidence using prices from 98 wheat markets between 1100 and 1799 that negative temperature shocks negatively affected food supply (raised wheat prices).

Introduction: Persecution or Toleration?

Research Questions:

- How frequent were expulsions and persecutions of Jewish communities between 1100 and 1800?
- How did the spatial distribution of expulsions and persecutions evolve over time?
- Were persecutions of Jews triggered by supply shocks?
- What were the mechanisms through which supply shocks increased persecution probability?

Findings:

- A one standard deviation decrease in temperature raised the probability of a pogrom or expulsion from 2% every five years to 3% to 3.5%.
- This effect was stronger in weaker polities and in regions with greater agricultural constraints.
- We argue that the gradual strengthening of polities and greater integration of markets helps explain the long-run decline in persecutions beginning around 1500.

Introduction: Related Literature

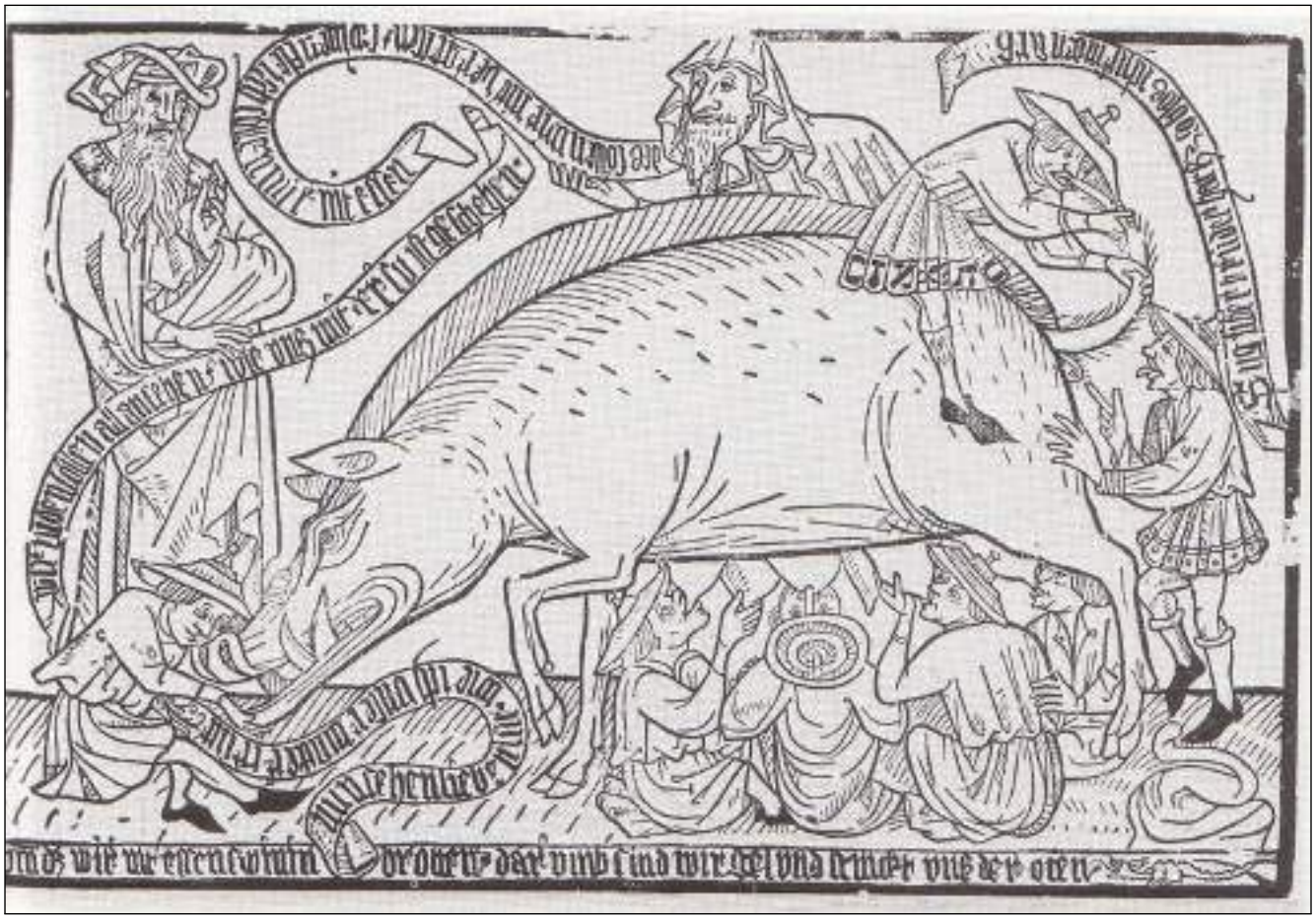
Persecution and Weather: Miguel (2005) shows variance in rainfall in Tanzania associated with more witch killings; Oster (2004) shows cold weather during Europe's little ice age associated with more witch trials; Chaney (2013) shows that weather shocks upset political equilibrium in pre-industrial Egypt.

Jewish Persecution: Voigtländer and Voth (2011) show persistence of anti-semitic belief from 14th to 20th centuries in Germany; Grosfled et al. (2013) argue that anti-market sentiments in the Pale of Settlement persisted; Botticini and Eckstein (2012) provide account of why Jewish communities became 'market dominant minorities' in Europe.

State Capacity: Vast literature. E.g. Tilly (1990) and Karaman and Pamuk (2013).

State Capacity & Tolerance: Johnson and Koyama (2014) show that weak fiscal capacity associated with persecution of witches in France; Johnson and Koyama (2013*a*) argue that the rise of the powerful states in the late middle ages and early modern period was associated with an inverse-U in the number of heretics persecuted.

Antisemitic Violence



Judensau (ca. 1470, Munich). These started appearing in Germany in 13th century. Placed in prominent, public, places.

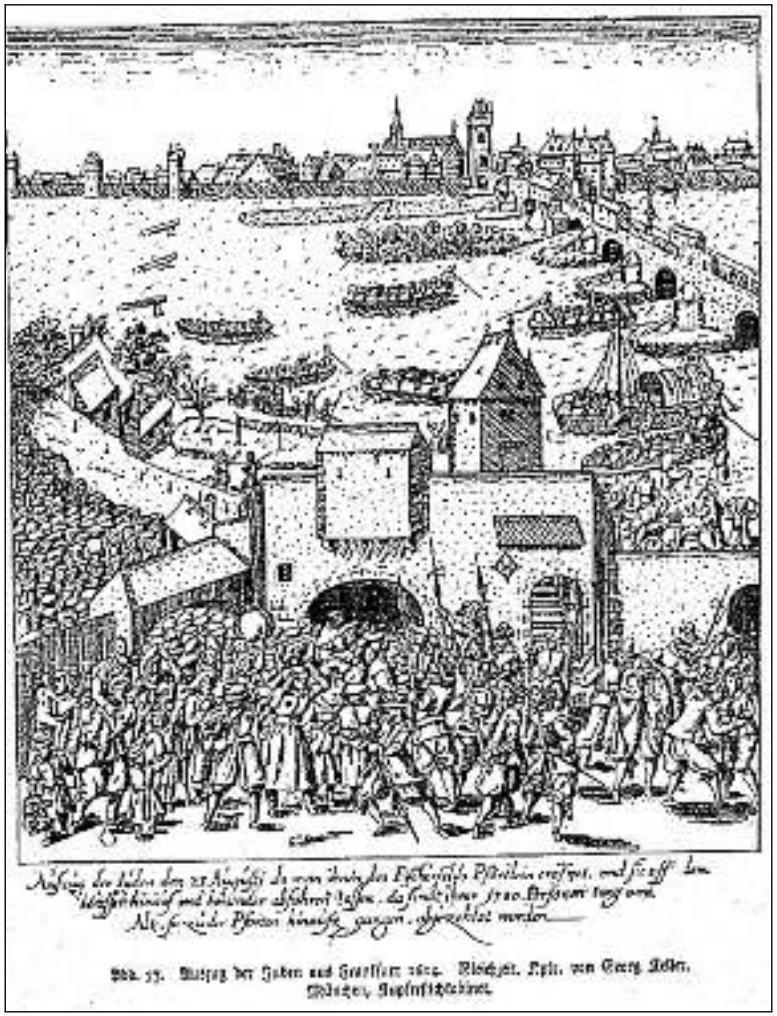
City-Level Expulsions & Persecutions

Illustration showing Jews receiving a charter of privileges from Emperor Henry VII in 1312. *Source*: Codex Baldvini; Koblenz, Municipal Archives.

Figure 3. A Jewish moneylender with his family in the background negotiating with a peasant and a townsman. A woodcut from Foltz, *Die Rechnung Kolpergers von dem Gesuch der Juden*, Nuremberg, 1491.

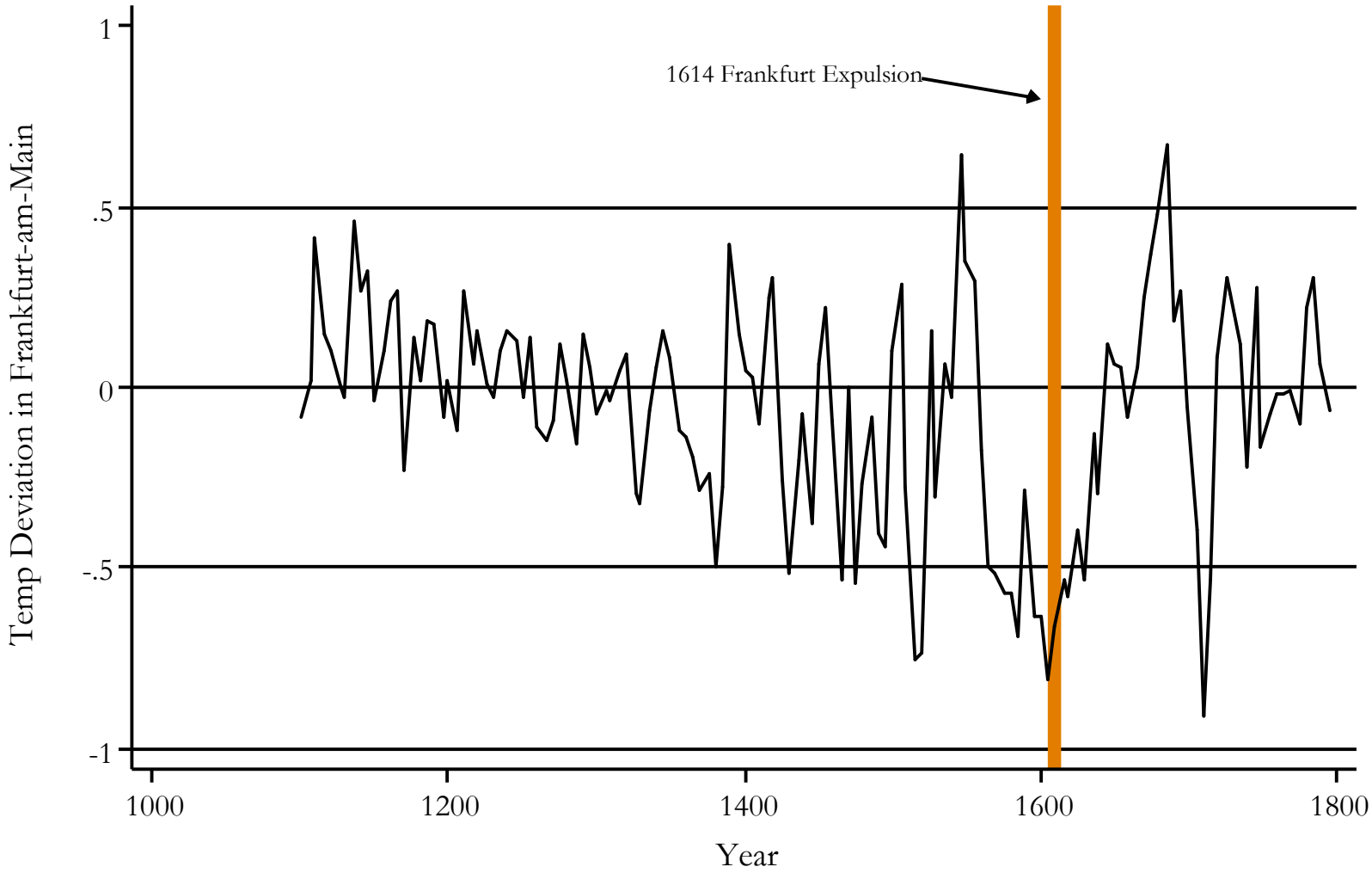
A Jewish money lender with his family in the background negotiating with a peasant and a townsman. Woodcut from Foltz: Die Rechnung Kolpergers von dem Gesuch der Juden – 'The billing of Kolpergers from the request of the Jews'. Nuremberg 1491

City-Level Expulsions & Persecutions



Expulsion in 1614 from Frankfurt-am-Main (an Imperial Free City since 1372). Economic and social antagonisms between wealthy patrician families of the city and the guild craftsmen and petty traders – many of whom were in debt to Jews. The struggle flared into open rebellion when in 1614 the rabble, led by Vincent Fettmilch, stormed the ghetto and gave vent to their anger by plundering the Jewish houses. The Jews were all expelled from the city, but the Emperor (Matthias of Austria, House of Habsburg) outlawed the rebels, and their leaders were arrested and put to death (1616). Subsequently the Jews were ceremoniously returned to the ghetto, an event annually commemorated on Adar 20th by the Frankfurt community as the 'Purim Winz'.

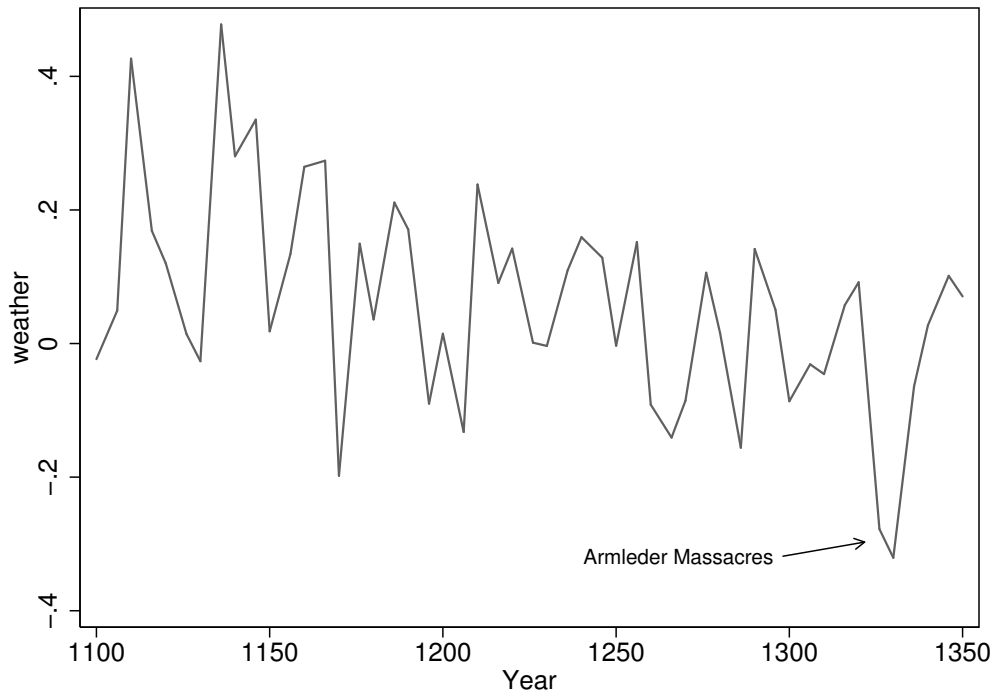
City-Level Expulsions & Persecutions



Five-year temperature deviation from 1961-1990 average in Frankfurt-am-Main (in degrees celcius). The years 1610-1614 are highlighted.
Source: Guiot and Corona (2010)

City-Level Expulsions & Persecutions

Tomb of Arnold von Uissigheim in parish church of St. Laurentius in Uissigheim. Was a knight turned highway robber. Instigated an 'economically motivated social uprising' that turned against the Jews (Levenson, 2012, 188) known as the Armleder massacres. Uissigheim was arrested and executed by Count Gottfried of Hohenlohe. But massacres continued across Bavaria and Alsace until 1338, destroying more than 100 Jewish communities



Temperature Deviations (Five-Year Averages) in Kitzingen 1100-1350. The Armleder pogroms (1336-1338) followed a period of extremely cold weather in Alsace and Franconia. Kitzingen is located in the band of land created by the dismemberment of the Carolingian empire at the Treaty of Verdun in 843. Historians and Political scientists, such as Stasavage (2011), argue that the lands known as Lotharingia which lie between the historical boundaries of France and Germany were areas of weak state authority and fragmentation.

Model: Preview of Results

Prediction 1 **Cold Weather and Persecutions:** Periods of cold weather raise likelihood that rebellion constraint will be violated and will thus be associated with the expropriation of Jewish community.

Prediction 2 **Soil Quality:** Regions facing greater agricultural constraints will be more affected by temperature shocks and will, accordingly, be more likely to persecute minority during cold weather.

Prediction 3 **State Capacity:** High state capacity makes it less likely that the rebellion constraint will be violated due to cold weather and lowers probability of a persecution.

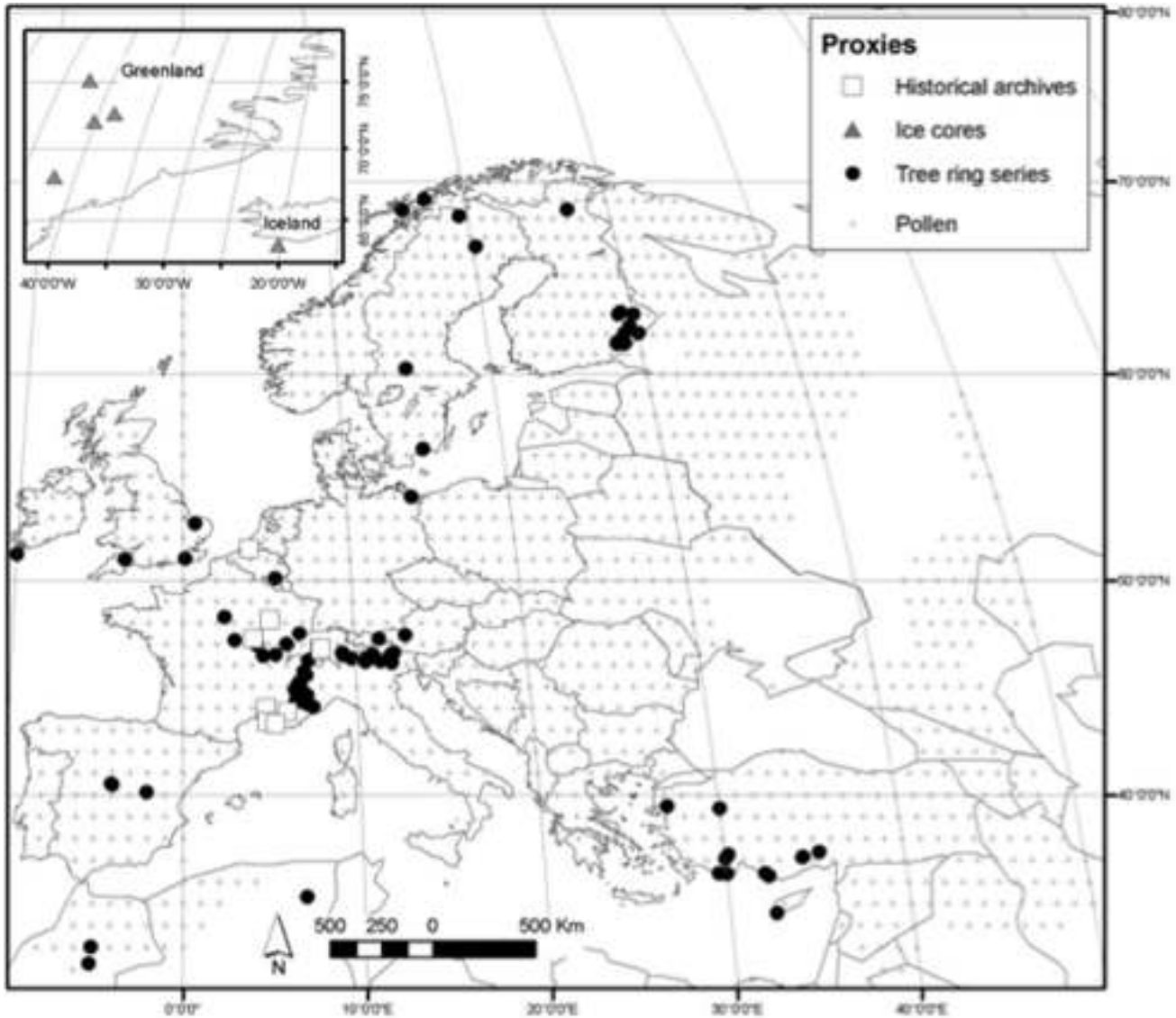
Data: Temperature

From Guiot and Corona (2010)

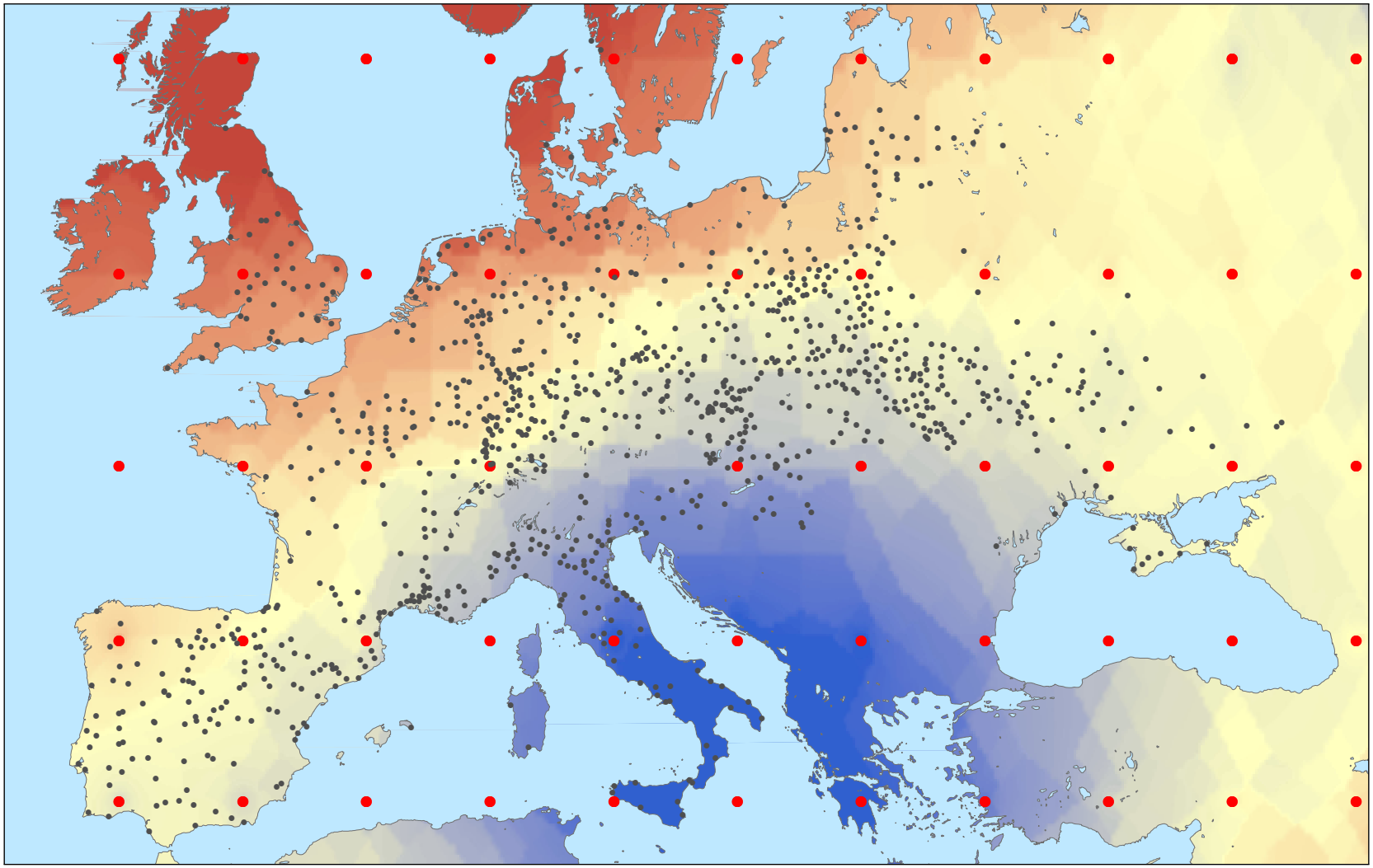
1. 95 tree ring series;
2. 16 indexed climatic series based on historical documents;
3. ice-core isotopic series
4. pollen-based series.

- Average growing season temperature (April to September)
- Expressed as anomalies relative to 1961–1990 average.
- Yearly temperature deviations reconstructed using proxies, calibrated using actual measured data from 1750 onwards.
- Cold periods in reconstructed data consistent with know 'forcing' events such as volcanic eruptions and periods of low solar activity (sunspots). Also consistent with glacial records.

Data: Temperature

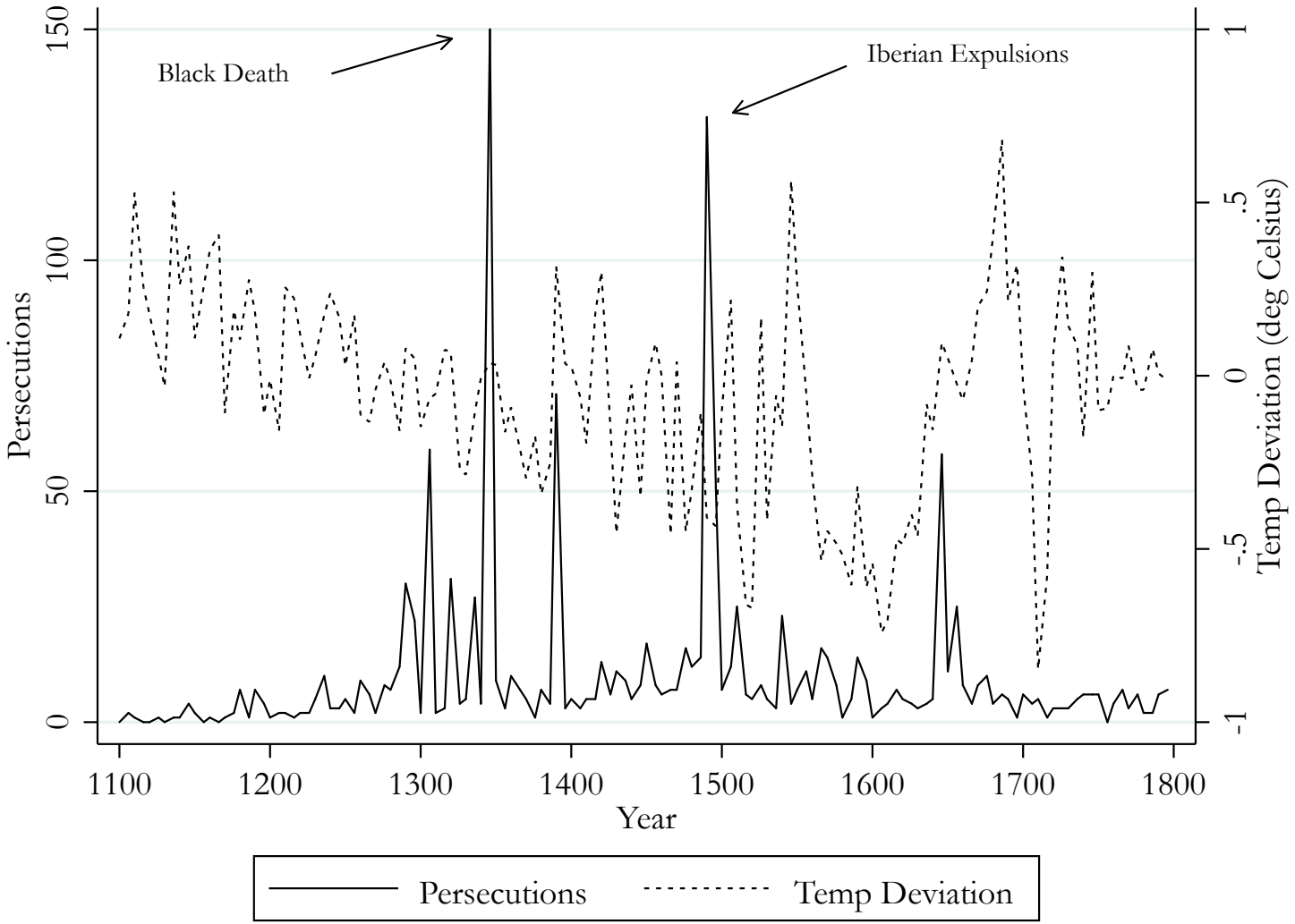


Data: Temperature

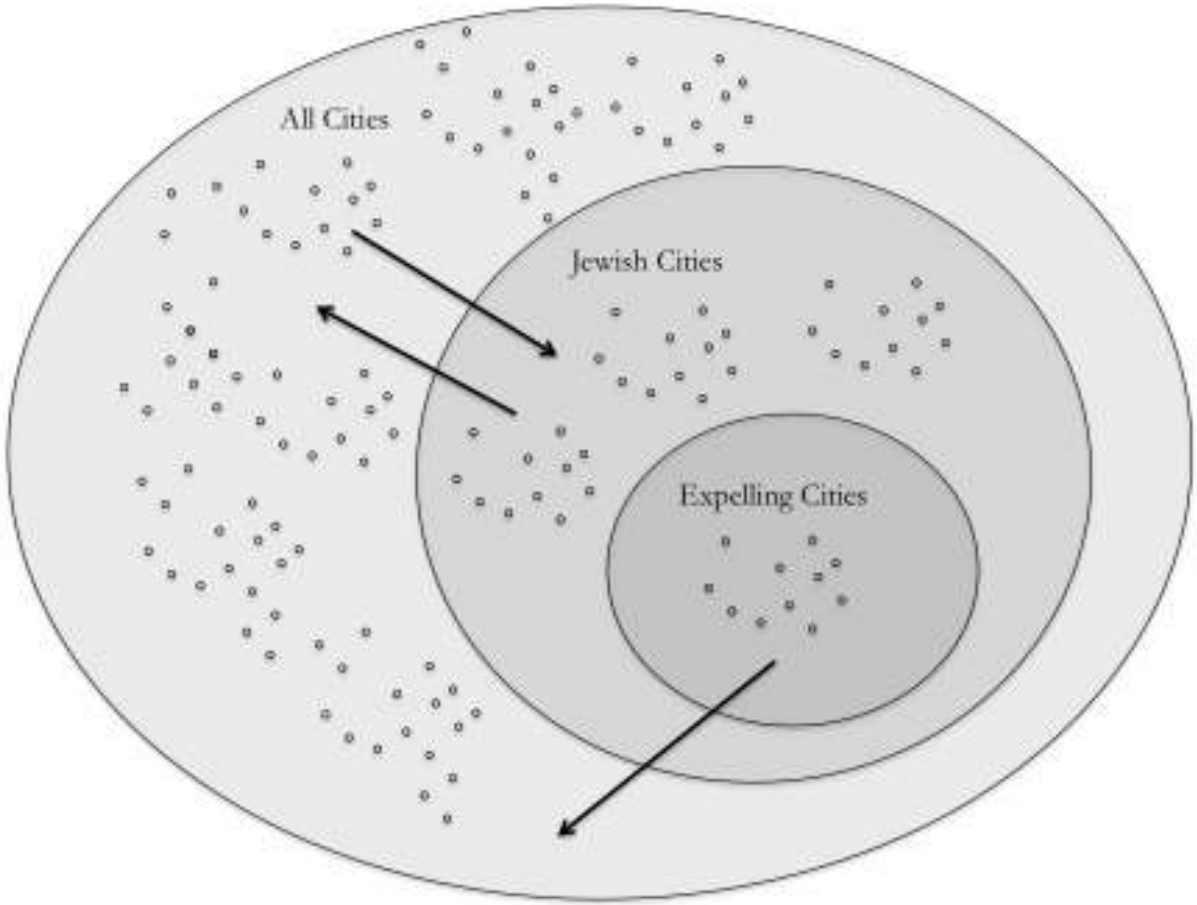


Smoothed temperature deviation map for 1100. Red is above average, blue is below average. Grey dots are cities that had Jewish populations.

Data: Persecutions



Data: Jewish Presence

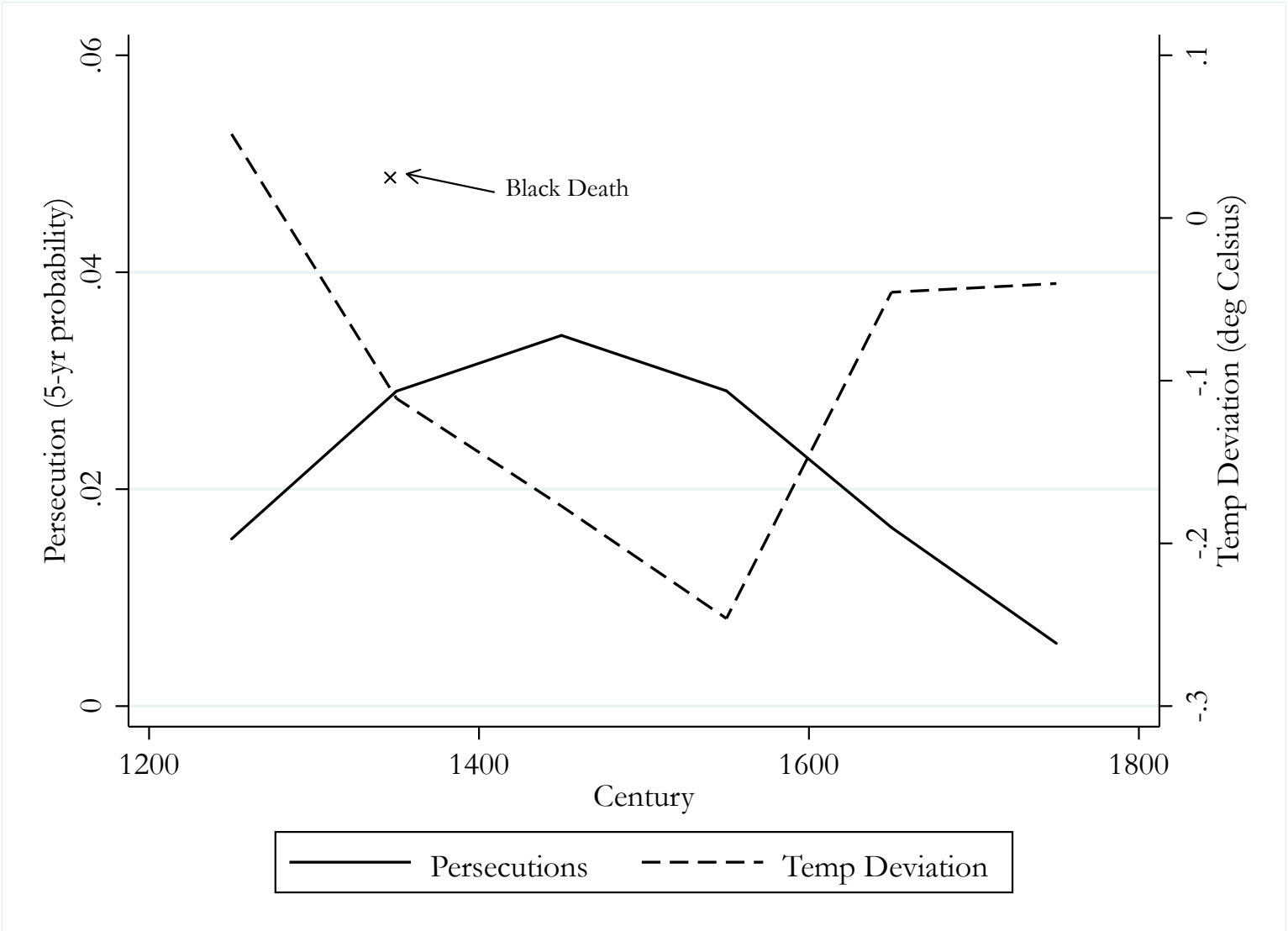


We only include cities in regressions with a Jewish population. Consistent with discussion in Box-Steffensmeier and Jones (2004) and Yamaguchi (1991).

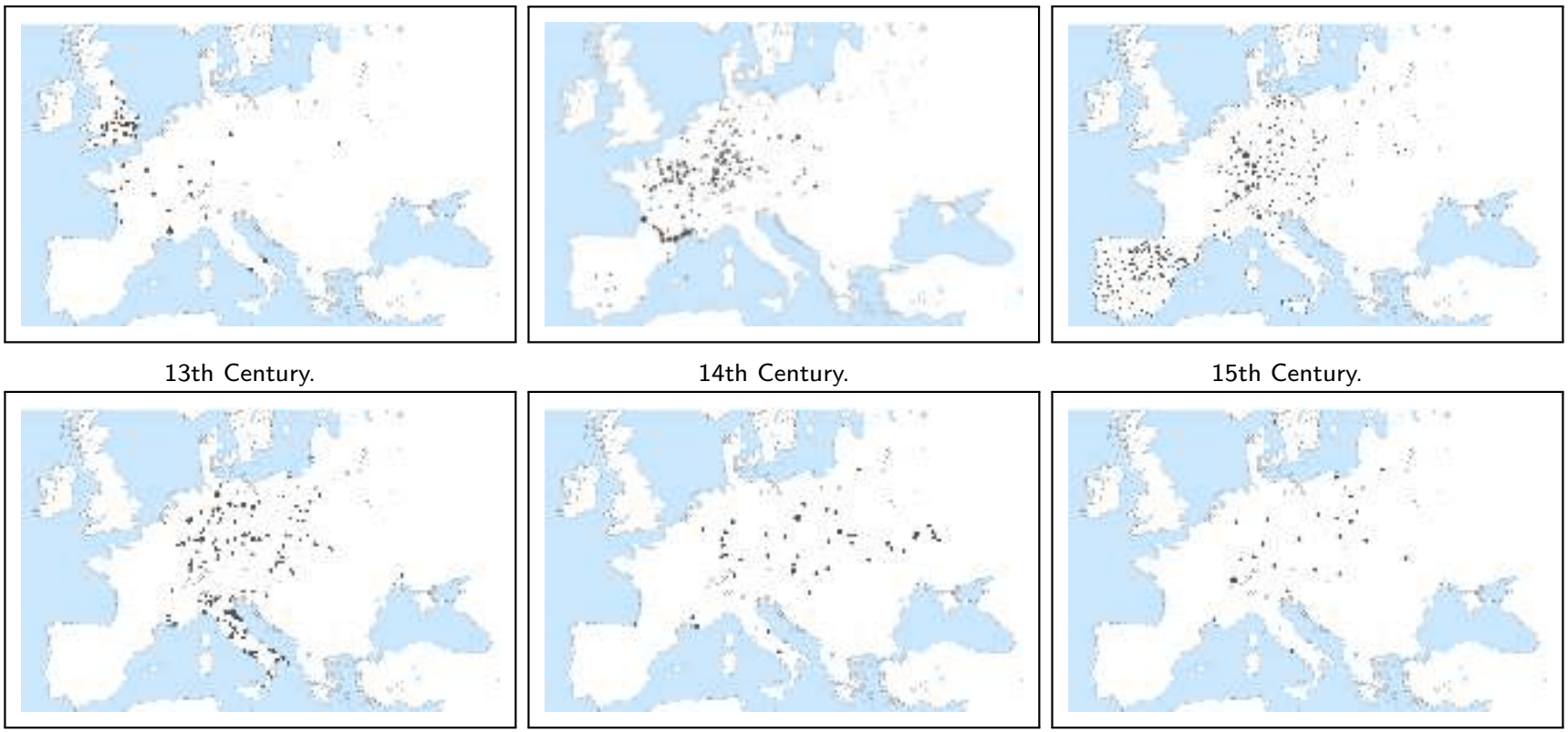
Data: Urban Density

- The most comprehensive data on city population is Bosker et al. (2013).
- But only cities with population $>$ 5,000. Just 54 cities in 800 and 615 cities by 1800.
- Our data from Jewish expulsions includes many smaller towns and cities missing from this database.
- To estimate Urban Density we create a smoothed 'heat map' of population using inverse weighted average of population of all Bosker cities within 100 km's of any given point.

Data: Descriptive Statistics



Data: Descriptive Statistics



13th Century. 14th Century. 15th Century.

16th Century. 17th Century. 18th Century.

Figure : Jewish Persecutions: 1200-1800.

Econometrics: Baseline Specification

Baseline regression equation:

$$y_{it} = \beta \text{ Temperature}_{it-1} + \eta_i + \mu_t + \mathbf{X}'_{it}\mathbf{\Omega} + \varepsilon_{it}$$

- where y_{it} measures whether an expulsion or pogrom occurred in city i during period t.
- Baseline uses 5-year averaged data. So panel is 936 (cities) X 140 (periods).
- Standard errors are clustered on weather-grid.
- Includes city and time period dummies in addition to controls for urban density and the ten years surrounding black death (1345-1354).

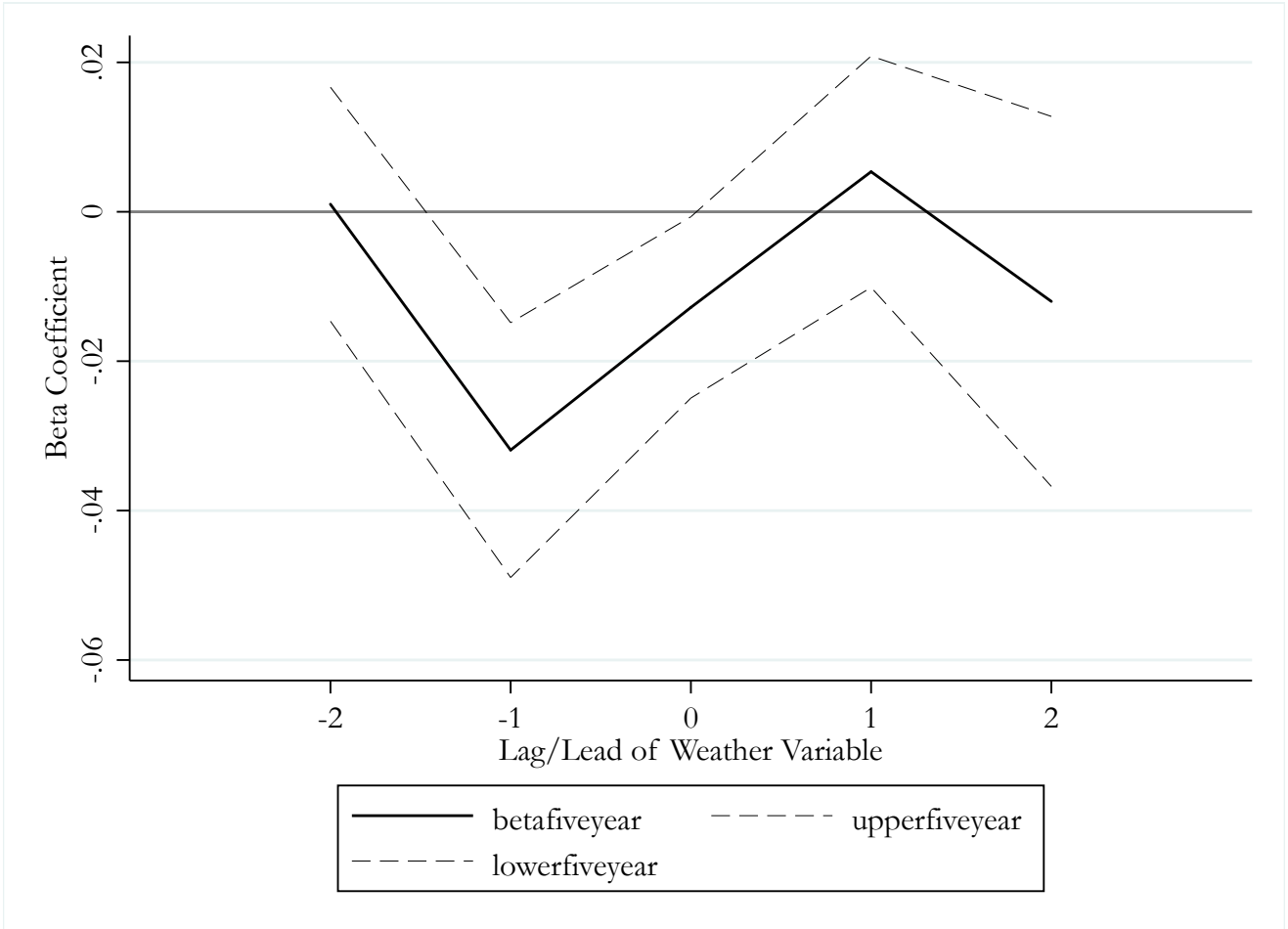
Econometrics: Baseline Results

Panel A: Baseline Effects of Temperature on Persecutions and Expulsions

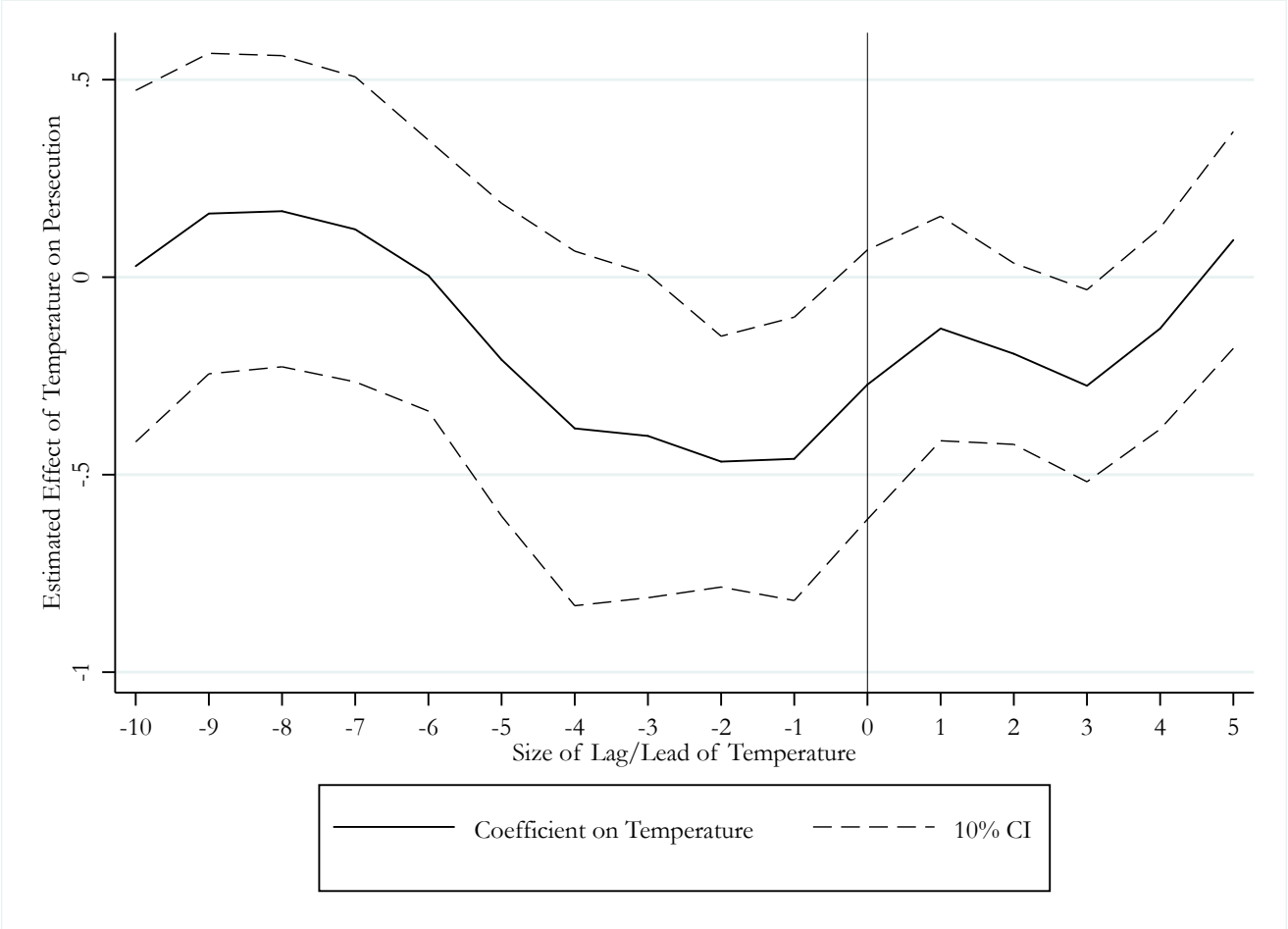
	Persecutions			Expulsions		
	(1)	(2)	(3)	(4)	(5)	(6)
Lag Temperature	-1.91***	-2.52***	-3.19***	-1.59***	-2.06***	-2.31***
	(0.625)	(0.740)	(1.04)	(0.447)	(0.512)	(0.891)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
City Dummies	No	Yes	Yes	No	Yes	Yo
Time Dummies	No	No	Yes	No	No	Yes
N	55698	55698	55698	55698	55698	55698
F	5.202	5.609	6.695	4.741	5.705	5.108
p-values	0.0029	0.0019	0.0006	0.0048	0.0017	0.0012

Under the DID specication in column (3), a one standard deviation decrease, or 1/3 of a degree, in temperature increases ve-year persecution probability by 1 percentage points which is equal to 50% of the sample mean of the dependent variable (2.22)

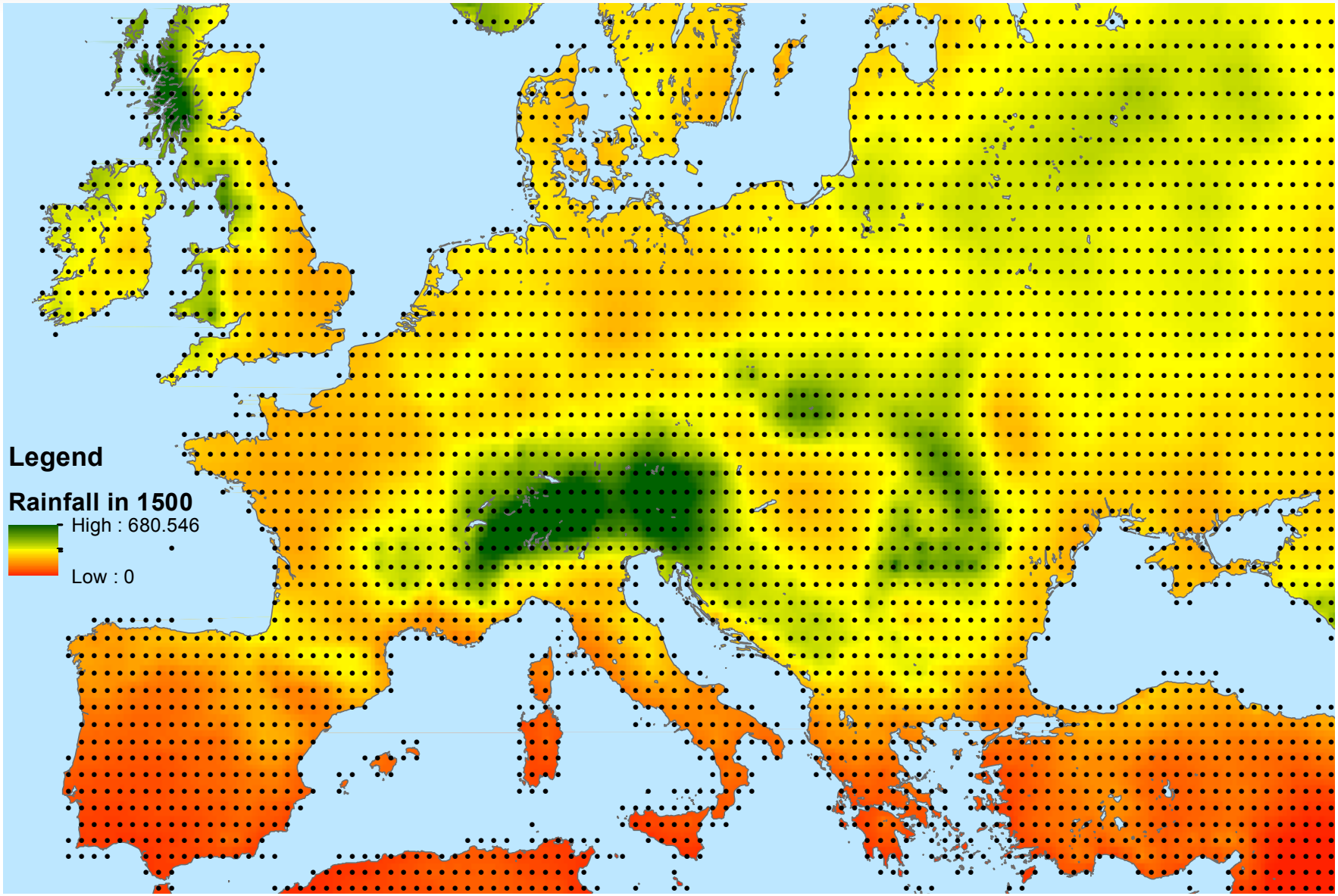
Econometrics: Placebo Tests - Five Year Data



Econometrics: Placebo Tests - One Year Data



Econometrics: Robustness to Rainfall Shocks



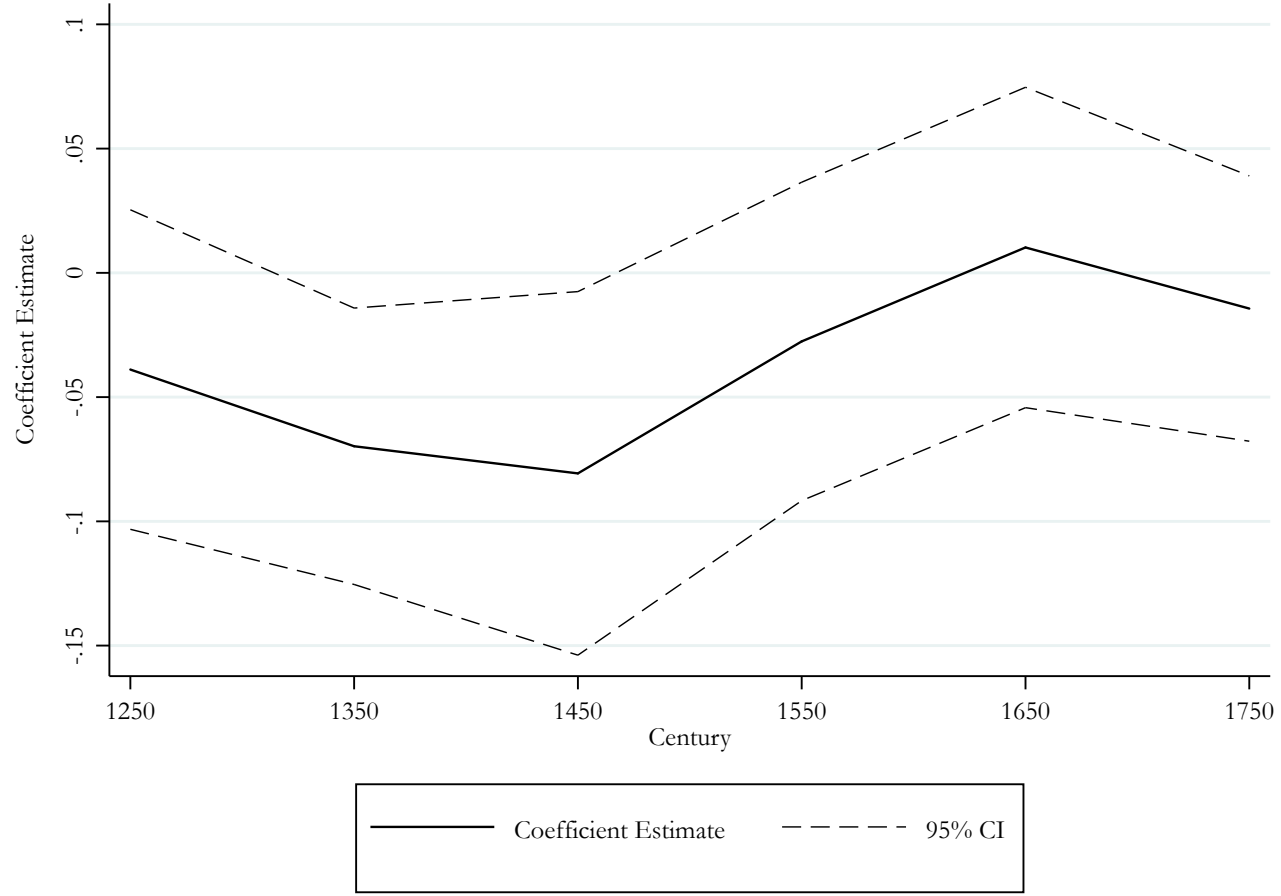
Econometrics: Rainfall Results

	Dependent Variable: Persecutions					
	1500–1800			1500–1700		
	(1)	(2)	(3)	(4)	(5)	(6)
Lag Rainfall	-2.04***	0.985*	-0.488	-3.44***	-0.545	-2.89**
	(0.494)	(0.561)	(0.795)	(0.751)	(0.972)	(1.44)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
City Dummies	No	Yes	Yes	No	Yes	Yes
Time Dummies	No	Yes	Yes	No	Yes	Yes
N	23094	23094	23094	13065	13065	13065
F	11.15	7.642	3.752	10.59	9.612	3.248
p-values	0.0000	0.0005	0.0000	0.0000	0.0001	0.0000

Standard errors in parentheses

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

Econometrics: Treatment Effect by Century



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Standard errors in parentheses

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

Econometrics: Mechanisms

- Now we test some of the specific predictions/channels of the model.
- Mechanisms regression equation:

$$y_{it} = \alpha \text{ Weather}_{it} + \beta \text{ Mechanism}_{it} + \zeta \text{ Mechanism}_{it} \cdot \text{Weather}_{it} + \eta_i + \mu_t + \mathbf{X}'_{it}\mathbf{\Omega} + \varepsilon_{it}$$

- where $Mechanism_{it}$ is a dichotomous measure of one of our predicted mechanisms.
- We are interested in both:
  - the indirect effect of the *Mechanism* on persecution probability: ζ
  - as well as the overall effect given by: $\frac{\partial y}{\partial Weather} = \alpha + \zeta \cdot Mechanism$

Econometrics: Mechanisms

- The specific mechanisms we will investigate are:
  - Did cities with more constrained agriculture persecute more?
  - Did cities in regions with weaker central state authority persecute more?
  - Did rule of law (constraints on political power) matter more than state capacity?

Data: Mechanisms: Wheat Suitability

- Data from FAO (Fischer et al., 2002).
- Codes geographical suitability for wheat production under intermediate level of inputs. Constructed using:
  1. Soil quality
  2. Ruggedness
  3. Drainage patterns
  4. Local Climate
  5. Crop Characteristics
- Coded at about a 50 X 50 km resolution.
- Graded 1-8 where 1 means most suitable for wheat production (lighter) and 8 is least suitable (darker).
- We construct variable "Poor Wheat Suitability" as $= 1$ for moderately to severely constrained agriculture.

Data: Mechanisms: Wheat Suitability

Darker regions are less suitable.

Econometrics: Mechanisms: Wheat Suitability

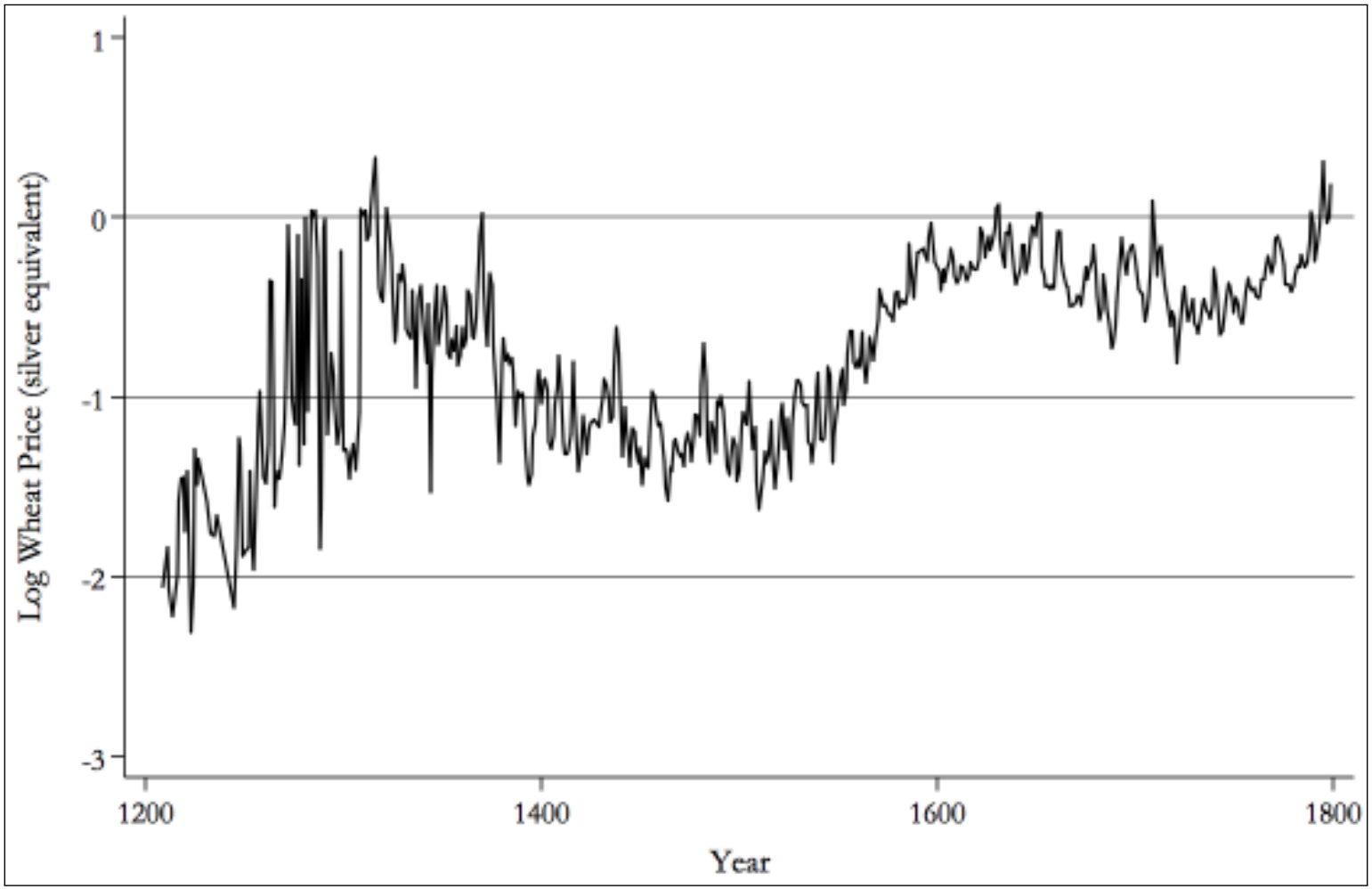
	(1)	(2)
Lag Temperature	-1.21**	-2.53***
	(0.485)	(0.876)
Low Wheat × Lag Temp	-2.77**	-1.13
	(1.29)	(0.731)
Low State Antiquity		
Low State Antiquity × Lag Temp		
Low Constraints		
Low Constraints × Lag Temp		
Low Capital Protection		
Low Capital Protection × Lag Temp		
Lag Temperature + Interaction	-3.979***	-3.656***
	(1.2)	(1.2)
Controls	Yes	Yes
City Dummies	Yes	Yes
Time Dummies	No	Yes
N	55698	55698
F	6.857	15.65
p-values	0.0003	0.0000

Standard errors clustered at the climate grid level n parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Data: Mechanisms: Wheat Prices and Weather?

98 grain markets from Allen and Unger (n.d.).

Data: Mechanisms: Wheat Prices and Weather?



Log of average yearly wheat prices from Allen and Unger (n.d.).

Data: Mechanisms: Wheat Prices and Weather?

	Dependent Variable: Wheat Price (log)								
	Full Sample			Before 1600			After 1600		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Weather	-0.0896***	-0.0443***	-0.0168**	-0.1925***	-0.0590*	-0.0191	-0.0674***	-0.0310***	-0.0152*
	(0.0113)	(0.0153)	(0.0082)	(0.0147)	(0.0323)	(0.0184)	(0.0102)	(0.0119)	(0.0082)
Lag Grain Price			0.6616***			0.6020***			0.6421***
			(0.0261)			(0.0108)			(0.0285)
Market dummies	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year dummies	N	Y	Y	N	Y	Y	N	Y	Y
Observations	16171	16171	15193	6232	6232	6232	9885	9885	9385
R-square	0.78	0.91	0.95	0.75	0.89	0.93	0.89	0.93	0.96

A Fisher-type unit root test on the data convincingly rejects the null of a unit root.

Econometrics: Mechanisms

- The specific mechanisms we will investigate are:
  - Did cities with more constrained agriculture persecute more?
  - Did cities in regions with weaker central state authority persecute more?
  - Did rule of law (constraints on political power) matter more than state capacity?

Data: Mechanisms: State Capacity

- Were persecutions more likely in cities associated with weak polities?
- We employ disaggregated data from the State Antiquity Index of Bockstette et al. (2002).
- Every modern day country, in each fifty year period, is assigned three numbers:
  1. Government above tribal level (0 or 1)?
  2. Government local, foreign, or in between (1, .50, or .75)?
  3. How much of modern country territory ruled by historical polity?
- Scores multiplied by each other and then by fifty. Autonomous nation = 50, tribal level gov't = 0.
- We create dummy variable for each city equal to one if that region has a score less than average for sample and zero otherwise.

Econometrics: Mechanisms: State Capacity

	(3)	(4)
Lag Temperature	-1.38***	-2.20***
	(0.429)	(0.738)
Low Wheat × Lag Temp		
Low State Antiquity	0.760	2.09***
	(0.454)	(0.524)
Low State Antiquity × Lag Temp	-2.92**	-2.34***
	(1.18)	(0.78)
Low Constraints		
Low Constraints × Lag Temp		
Low Capital Protection		
Low Capital Protection × Lag Temp		
Lag Temperature + Interaction	-4.30***	-4.538***
	(1.20)	(1.26)
Controls	Yes	Yes
City Dummies	Yes	Yes
Time Dummies	No	Yes
N	55698	55698
F	5.891	6.254
p-values	0.0000	0.0005

Econometrics: Mechanisms

- The specific mechanisms we will investigate are:
  - Did cities with more constrained agriculture persecute more?
  - Did cities in regions with weaker central state authority persecute more?
  - Did rule of law (constraints on political power) matter more than state capacity?

Data: Mechanisms: Rule of Law vs State Capacity?

- Our hypothesis is about strong and stable states, not necessarily states with high constraints protecting capital and other forms of property, that were more likely to be able to commit to rent-seeking arrangements with Jewish communities.
- To test whether constraints mattered more than (or in addition to) state capacity, we use the data on constraints on executive and protection of capital from Acemoglu et al. (2005).
- Similar to the State Antiquity variable, we code these data to be 0 if below average in sample and 1 if above average.

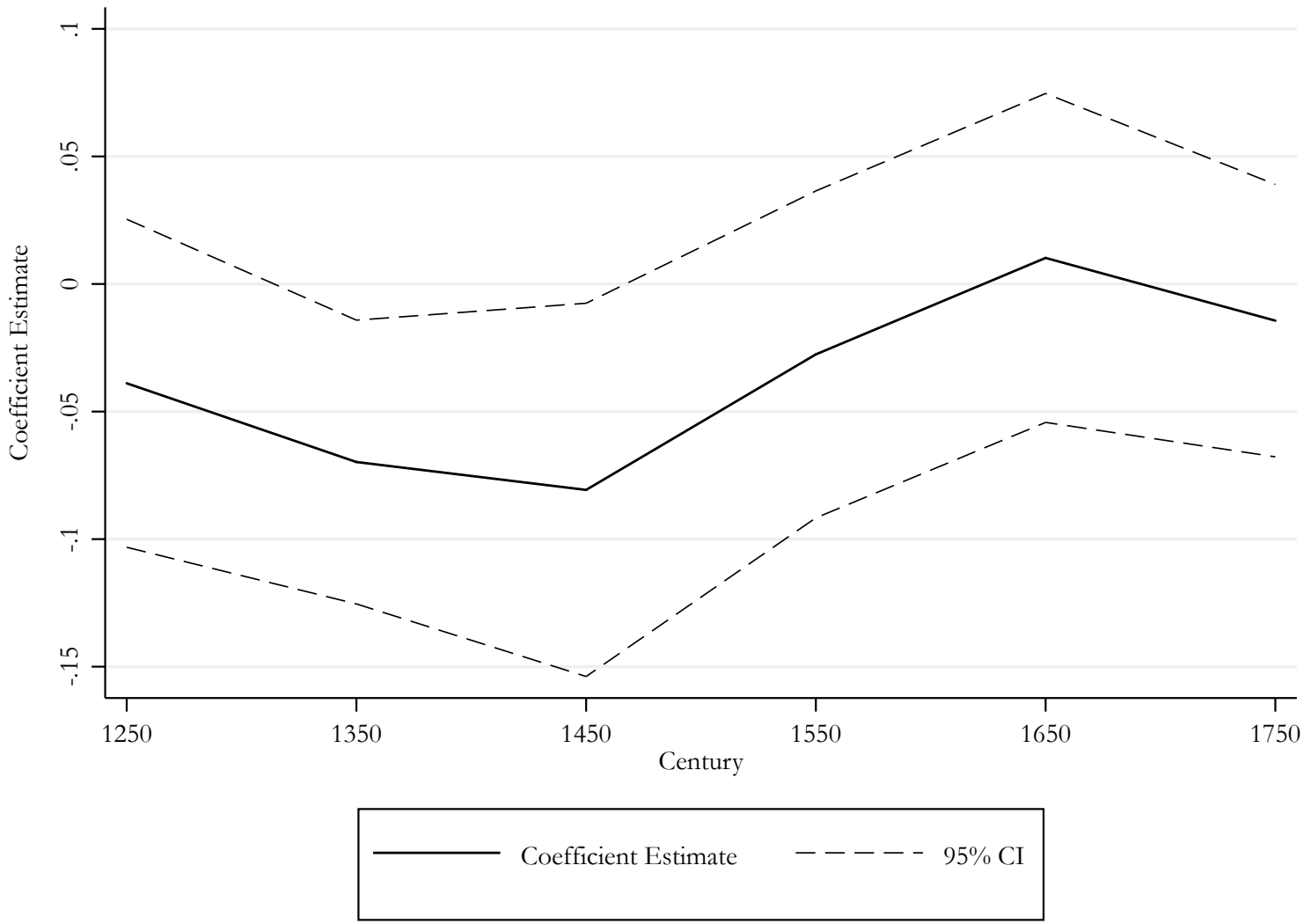
Econometrics: Mechanisms: Rule of Law vs State Capacity?

	(5)	(6)	(7)	(8)
Lag Temperature	-2.75**	-3.59***	-3.03**	-3.30**
	(1.01)	(1.24)	(1.36)	(1.64)
Low Wheat × Lag Temp				
Low State Antiquity				
Low State Antiquity × Lag Temp				
Low Constraints	-1.43**	0.321		
	(0.611)	(0.699)		
Low Constraints × Lag Temp	1.29	1.36*		
	(1.02)	(0.758)		
Low Capital Protection			-1.63*	0.259
			(0.890)	(0.626)
Low Capital Protection × Lag Temp			0.876	0.113
			(0.0126)	(0.0104)
Lag Temperature + Interaction	-1.46***	-2.23***	-2.158***	-3.19***
	(0.37)	(0.69)	(0.6)	(0.83)
Controls	Yes	Yes	Yes	Yes
City Dummies	Yes	Yes	Yes	Yes
Time Dummies	No	Yes	No	Yes
N	55698	55698	55698	55698
F	11.36	4.275	4.351	5.664
p-values	0.0000	0.0052	0.0032	0.0010

Econometrics: Summary of Results

- Over the entire sample, a 1 sd decrease in growing season temperature associated with between a 1% and a 1.5% increase in 5-year probability of persecution (relative to baseline of 2%).
- Cities in regions with more constrained agriculture were more likely to persecute.
- Cities in regions with weaker polities were more likely to persecute.
- Constraints on executive and protection of capital are uncorrelated with persecutions.

Why the Decline in Persecution After 1500?



Interpretation: Selection?

- During the medieval period Jewish populations had been widely distributed across Europe, but many of these were destroyed by seventeenth century. Is the decrease in persecutions attributable to movement of Jews out of Europe?

City-Years Before and After 1600

Country	City-Years Before 1600	City-Years After 1600	Persecutions Before 1600	Persecutions After 1600	Persecutions Per City Year Before/After 1600
Austria	4,223	1,402	19	7	0.90
England	3,530	1,414	55	0	∞
France	25,346	6,477	233	6	9.92
Germany	41,080	19,254	335	24	6.54
Italy	29,847	8,654	108	19	1.65
Poland	16,012	21,814	47	66	0.97
Portugal	5,734	0	21	0	∞
Spain	36,065	0	204	0	∞
Switzerland	2,890	697	25	2	3.02

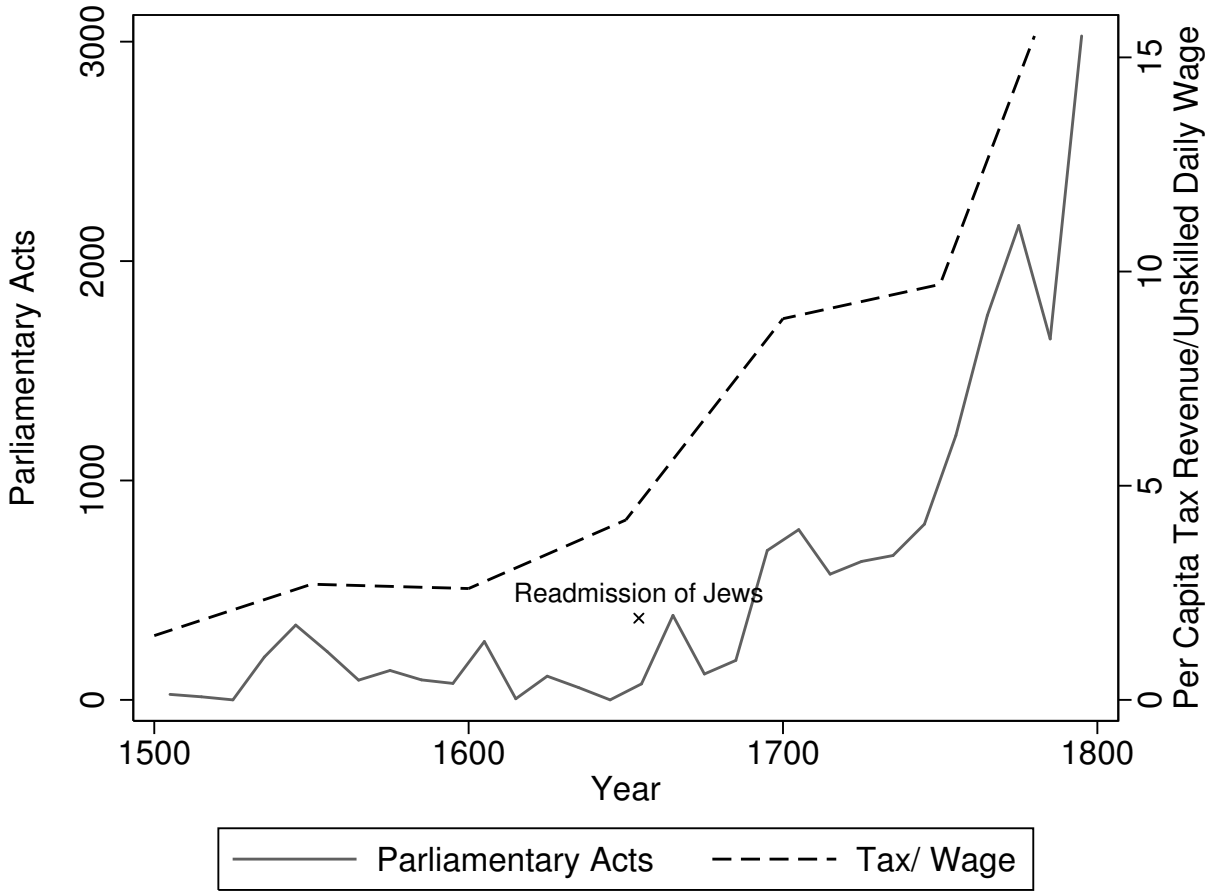
Notes. Data source: Enc (2007).

Interpretation: Stronger States?

- Our model suggests that in societies with greater state capacity the relationship between weather shocks and Jewish persecutions should be weaker.

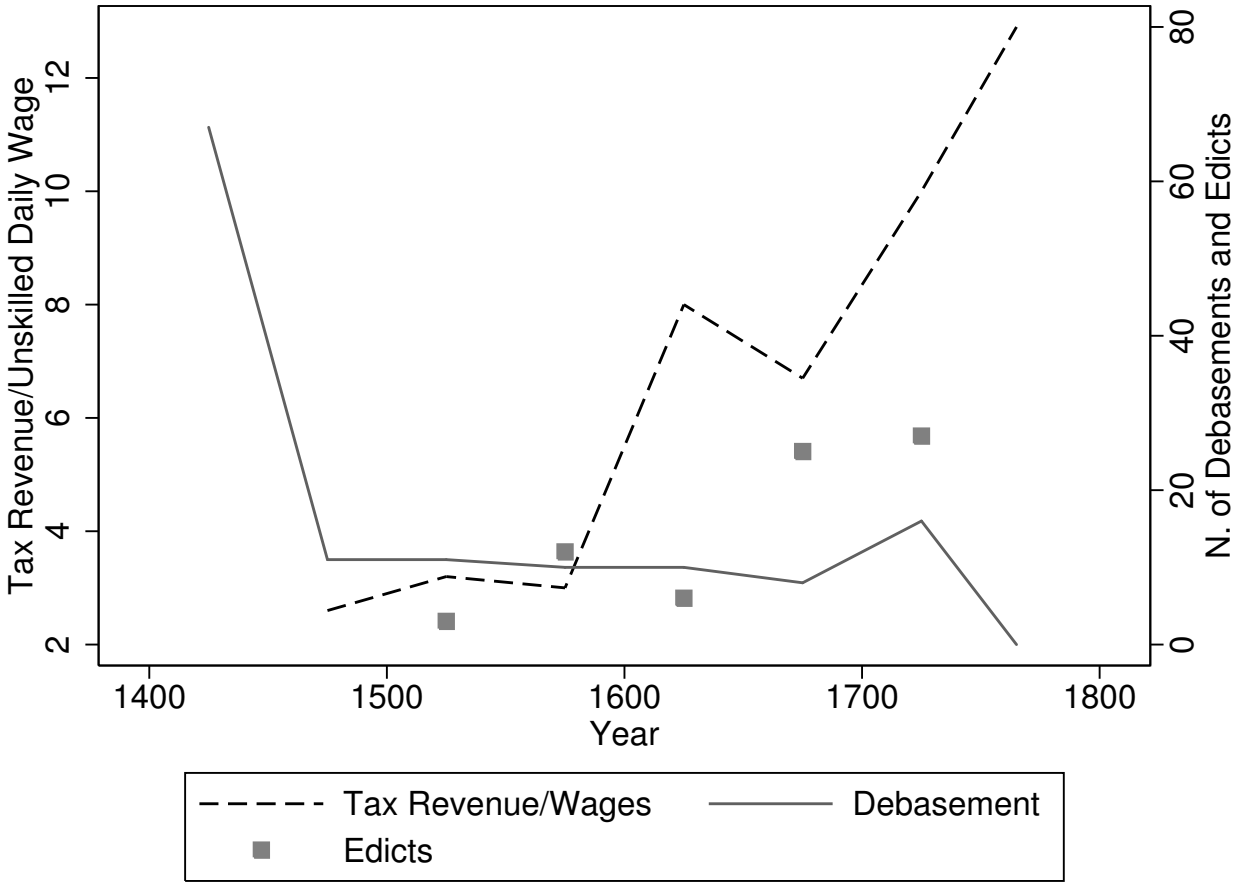
- Our empirical results support this both directly through the State Antiquity variable and through the timing suggested by the pre-1600 variable (Karaman and Pamuk, 2013; Dincecco, 2009; Bonney, 1995).

Interpretation: Stronger States?: England



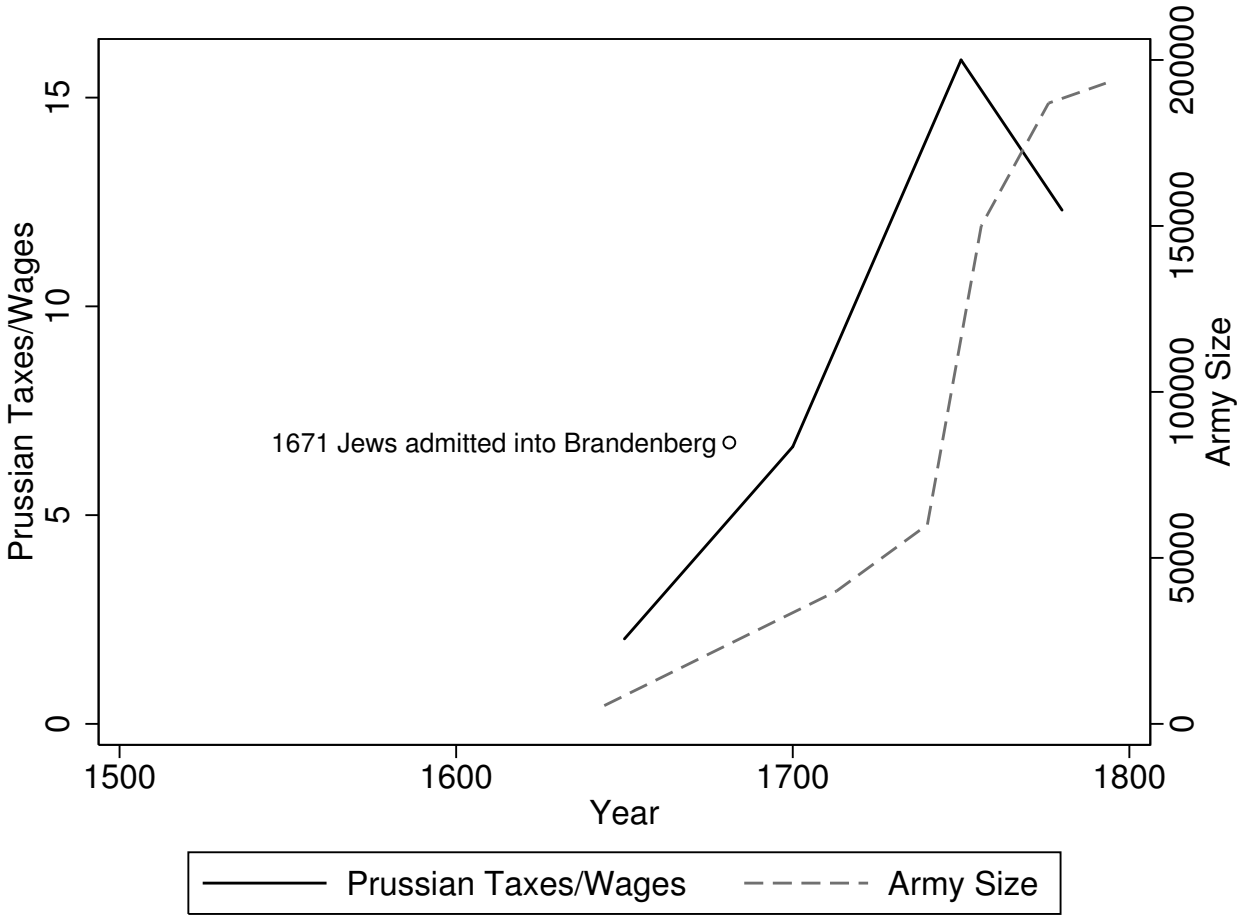
Tax Revenues and Parliament Acts in England

Interpretation: Stronger States?: France



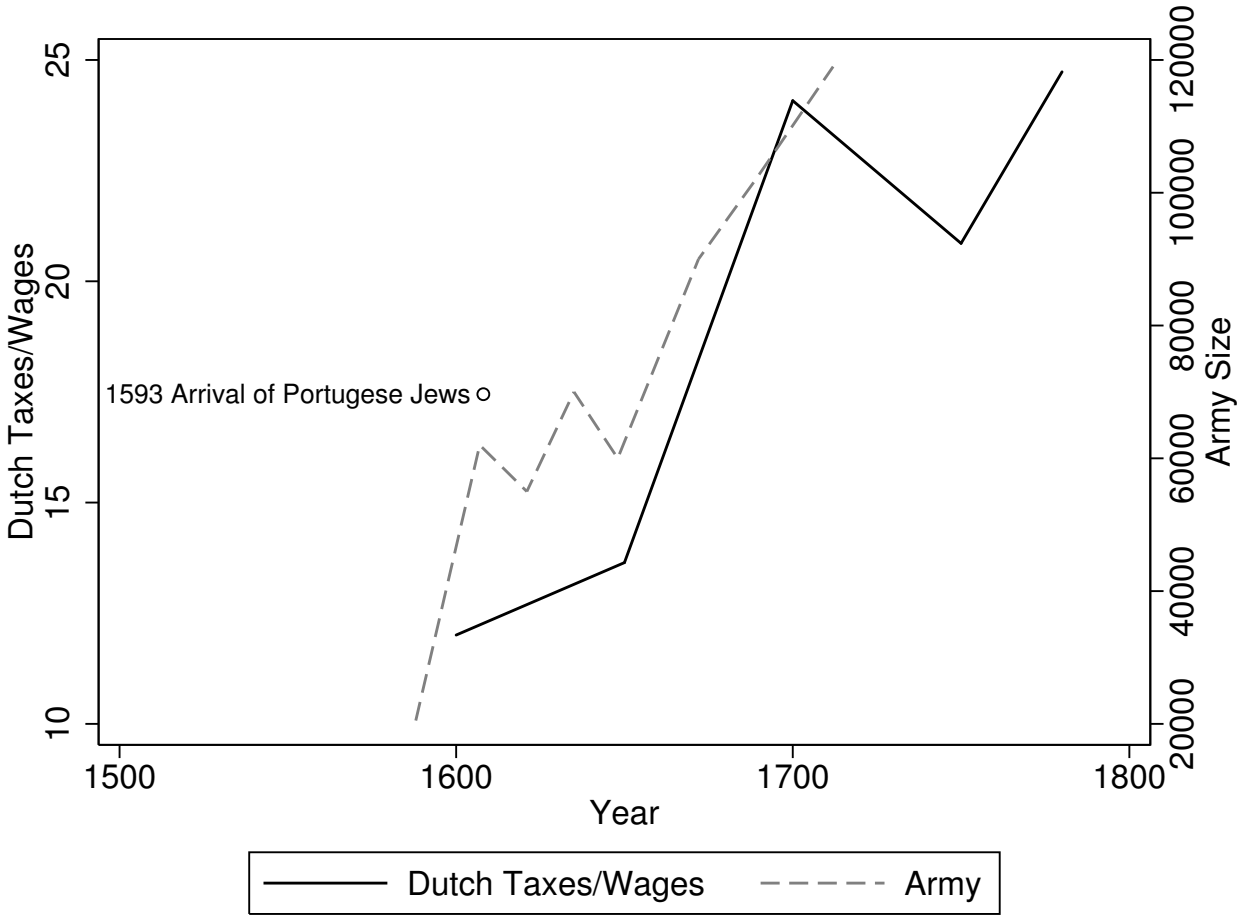
Tax Revenues, Royal Edicts, and Debasements in France

Interpretation: Stronger States?: Prussia



Tax Revenues and Army Size in Prussia

Interpretation: Stronger States?: Dutch Republic



Tax Revenues and Army Size in the Dutch Republic

Conclusion: Temperature and Jewish Persecution

- Climate affects politics and, more specifically, tolerance for minority groups.
- In the late middle ages cold weather had a significant effect on the likelihood of a Jewish community being expelled or persecuted.
- We model the economic relationship between the Jewish community and ruler as one designed to maintain political order.
- Model's predictions concerning agricultural constraints and state capacity are supported by empirical results.
- Our model, combined with historical evidence, suggests that the effect of weather on persecutions should have been largest in weaker states. . . This requires further investigation, which is what we've been working on. . . (Johnson and Koyama, 2014, 2013*a*,*b*).

Extra Slides

National Expulsions & Persecutions in Germany

- Charles IV elected emperor "in a very weak position".
- The Golden Bull (1356): 'Charles employed many devices for raising monies from or by means of the Jews. He "sold" the Jews to the cities . . . he gave the cities a mortgage on the taxes from the Jews in exchange for large sums of cash' (Breuer, 1988, 146-147).
- During Black Death, he cleared the Jews from blame and protected them in Prague.
- But he allowed Jews to be killed en masse elsewhere in his empire.

Charles IV, Holy Roman Emperor (1346-1378)

Examples: England

- Anti-semitic violence and local expulsions common in 13th c. England (e.g. Blood Libels of William of Norwich and Little Saint Hugh of Lincoln).
- Edward I expelled England's Jews in 1290 at request of Parliament. At the same time as expulsion, a heavy tax was imposed on non-Jews.
- Jews only readmitted in 1655 by Oliver Cromwell.
- No persecutions or expulsions after 1655.

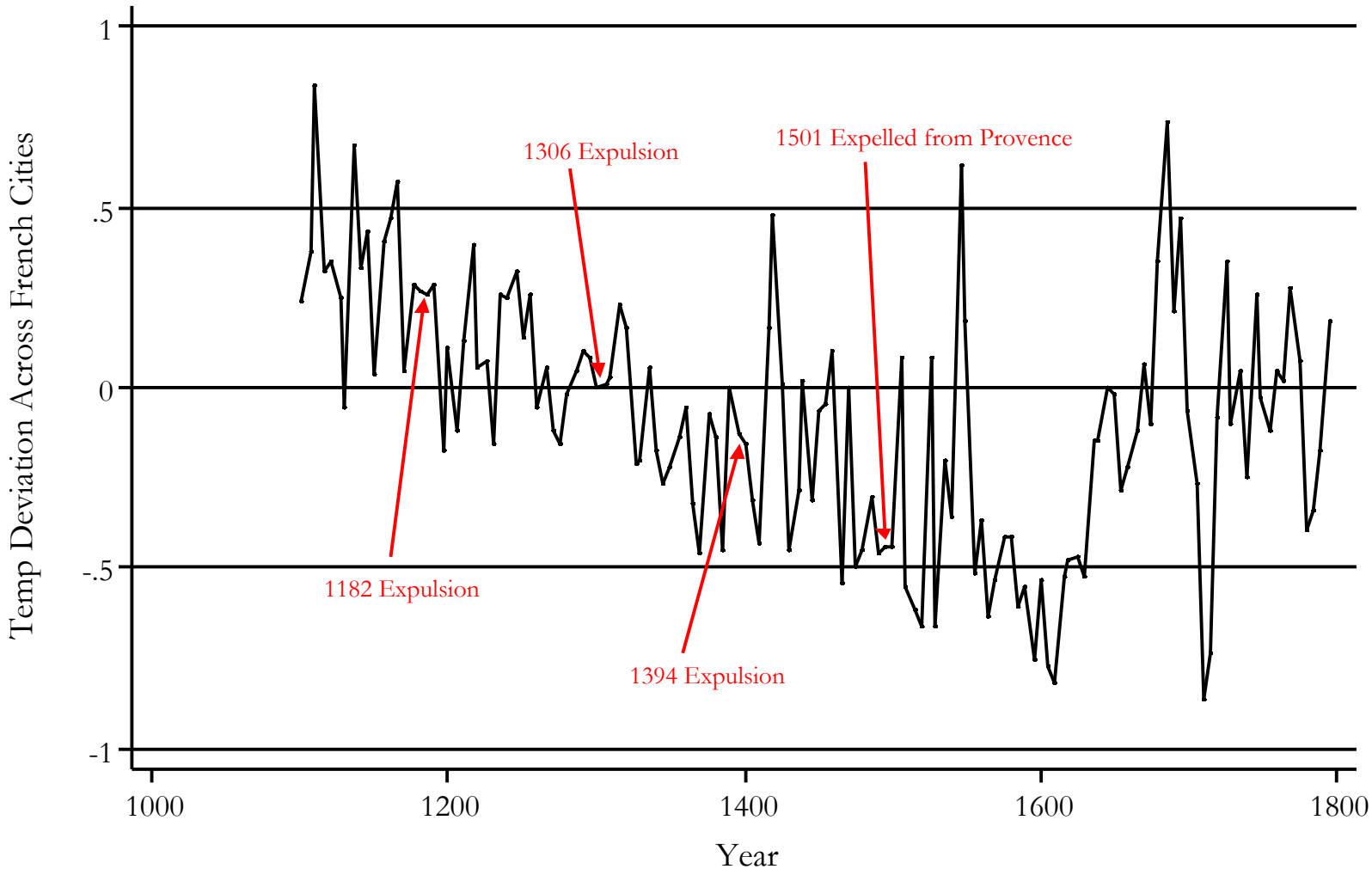
Edward I and Eleanor of Castile.

National Expulsions & Persecutions: France

- Philippe Augustus expels Jews from royal lands in 1182. Recalled in 1198. Numerous local expulsions during the 13th century.
- Philippe IV expels Jews from France in 1306.
- Readmitted 1315. A series of massacres and local expulsions in 1320-1322.
- Jews expelled from France in 1394; from Provence in 1501.
- Jewish communities slowly gain tacit acceptance in 17th c. First official recognition in 1722.
- Jews also expelled from England (1290), Spain (1492), and Portugal (1497).

Philippe IV 'the fair'.

National Expulsions & Persecutions: France



Five-year temperature deviation from 1961-1990 average across French cities (in degrees celcius). *Source*: Guiot and Corona (2010)

National Expulsions & Readmittances

Country	Expulsion	Readmittance
England	1290	1655
France	1306	1315
France	1394	1675
Portugal	1497	1800
Spain	1492	1868
Ottoman Empire formal invitation issued by Sultan		1492

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