The Economic Origins of Government

Leander Heldring (with Bob Allen and Mattia Bertazzini)

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Motivation

Question: What are the origins of government?

- Core question in social science and humanities, since Plato, Hobbes and Locke
- In my discipline, studied as a normative question: What the government should be doing (Samuelson, 1954; Baumol, 1952)

It is helpful to categorize the many theories into two broad clusters:

- Extractive: Incentives for surplus extraction $\rightarrow$ government
- Cooperative: Demand for public goods/services $\rightarrow$ government

Differentiating between the two empirically is difficult:

- Because governments collect data, we lack data on government/state formation
- Need variation that identifies return to cooperation/extraction

Today: Results in the context of the first states in Iraq

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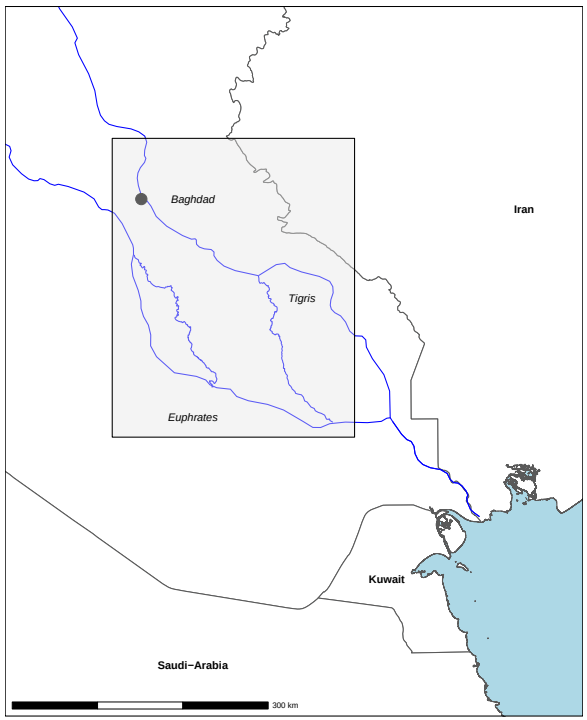
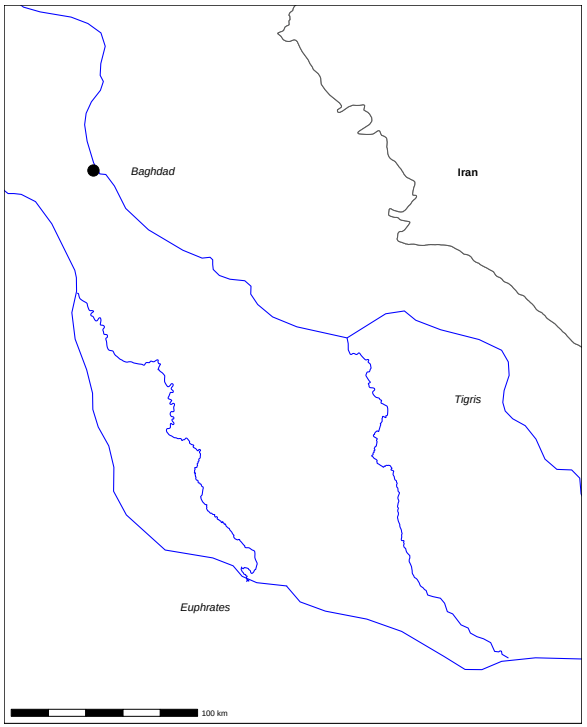
Setting: Southern Iraq

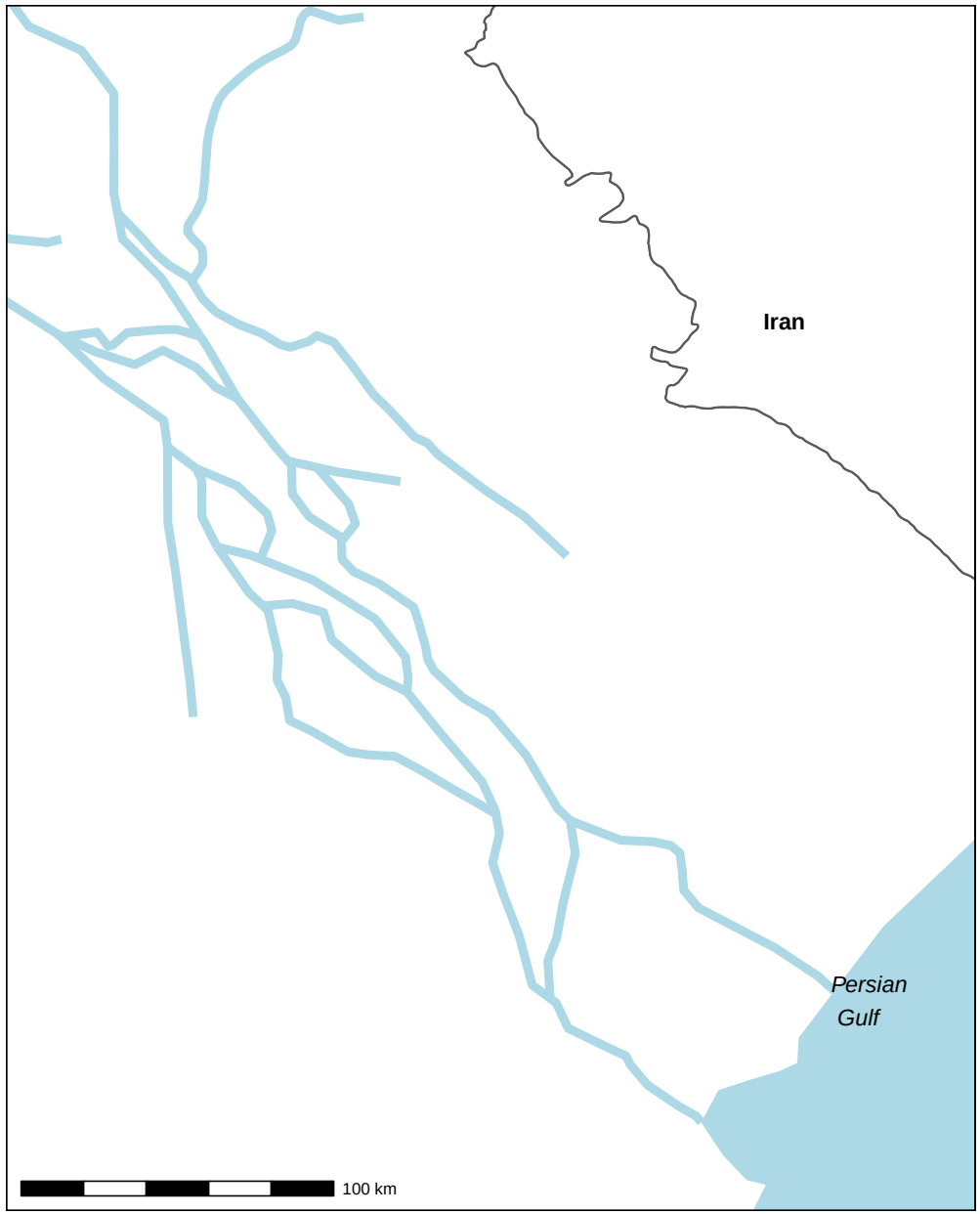




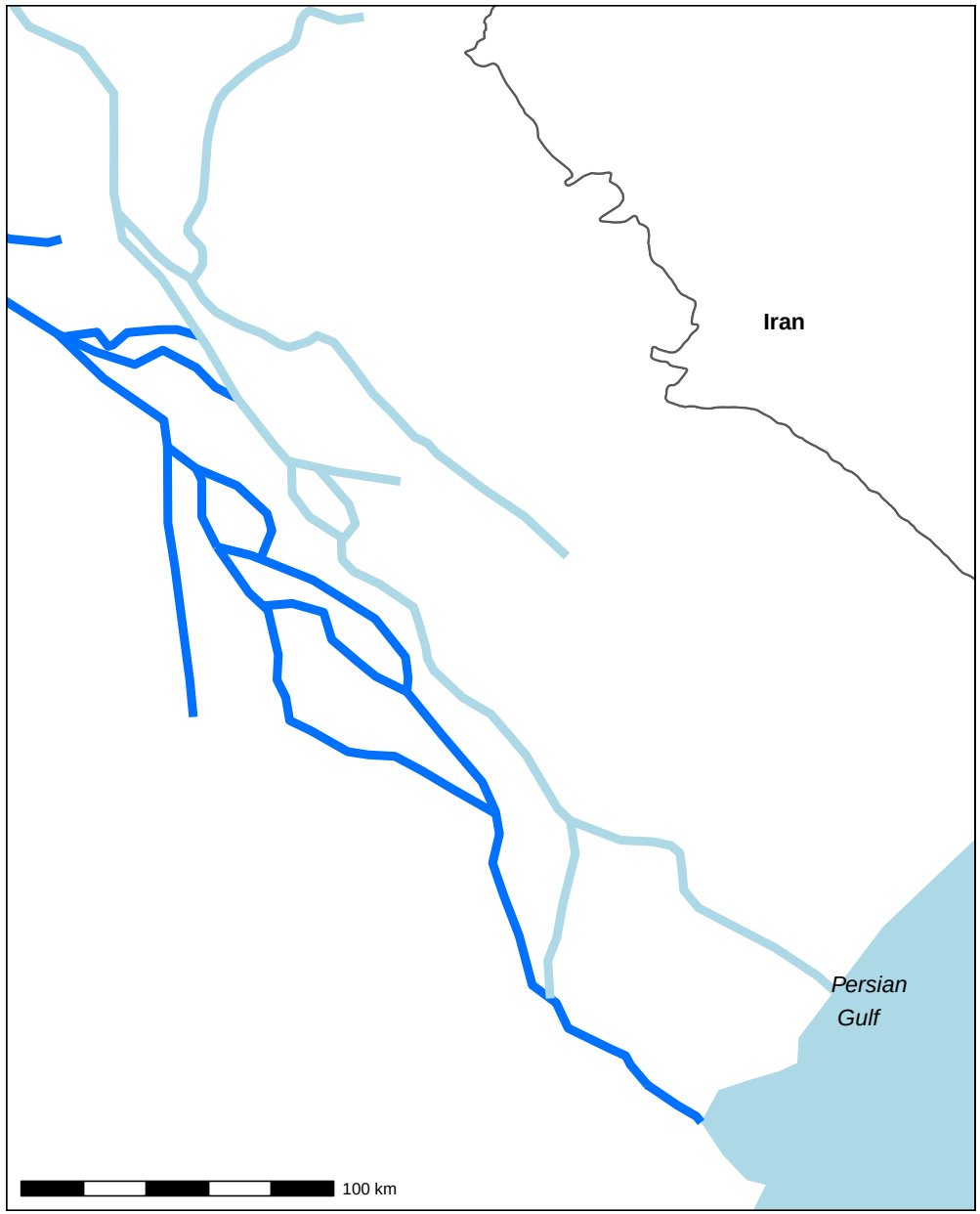
Shifting rivers: 5000BC and today

Map: Study area with prehistorical and modern rivers

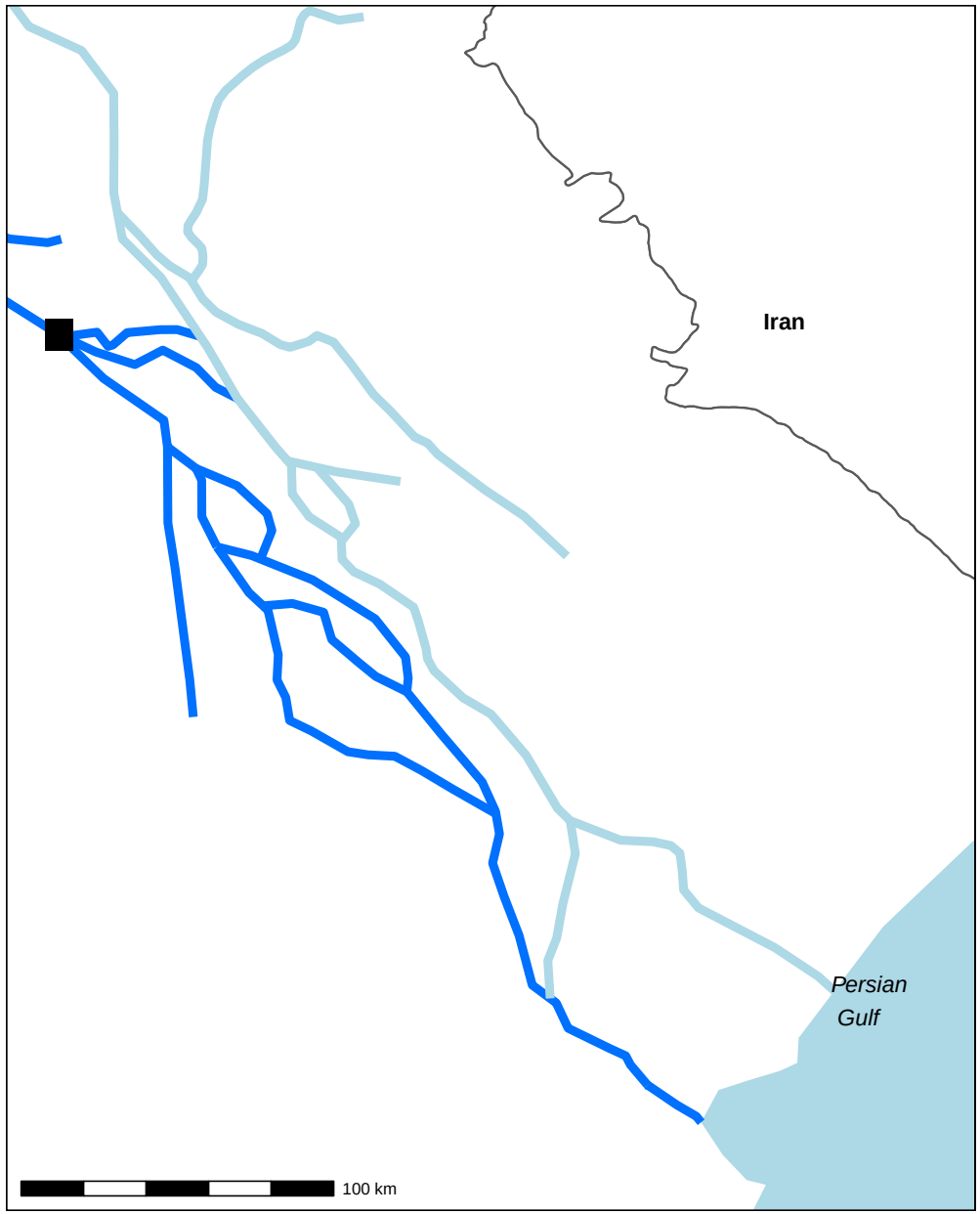
River shift example: before



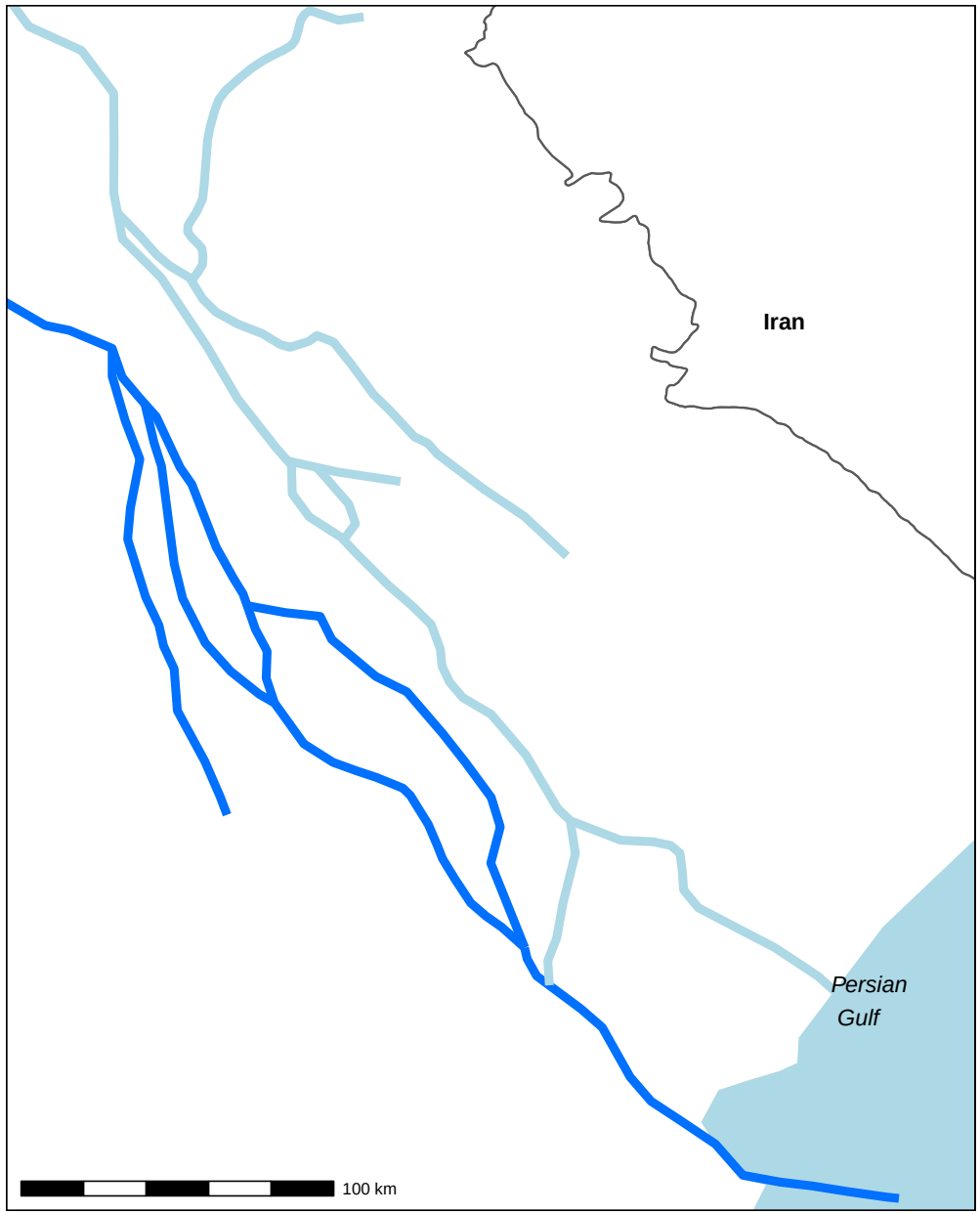
River shift example: shifting branches



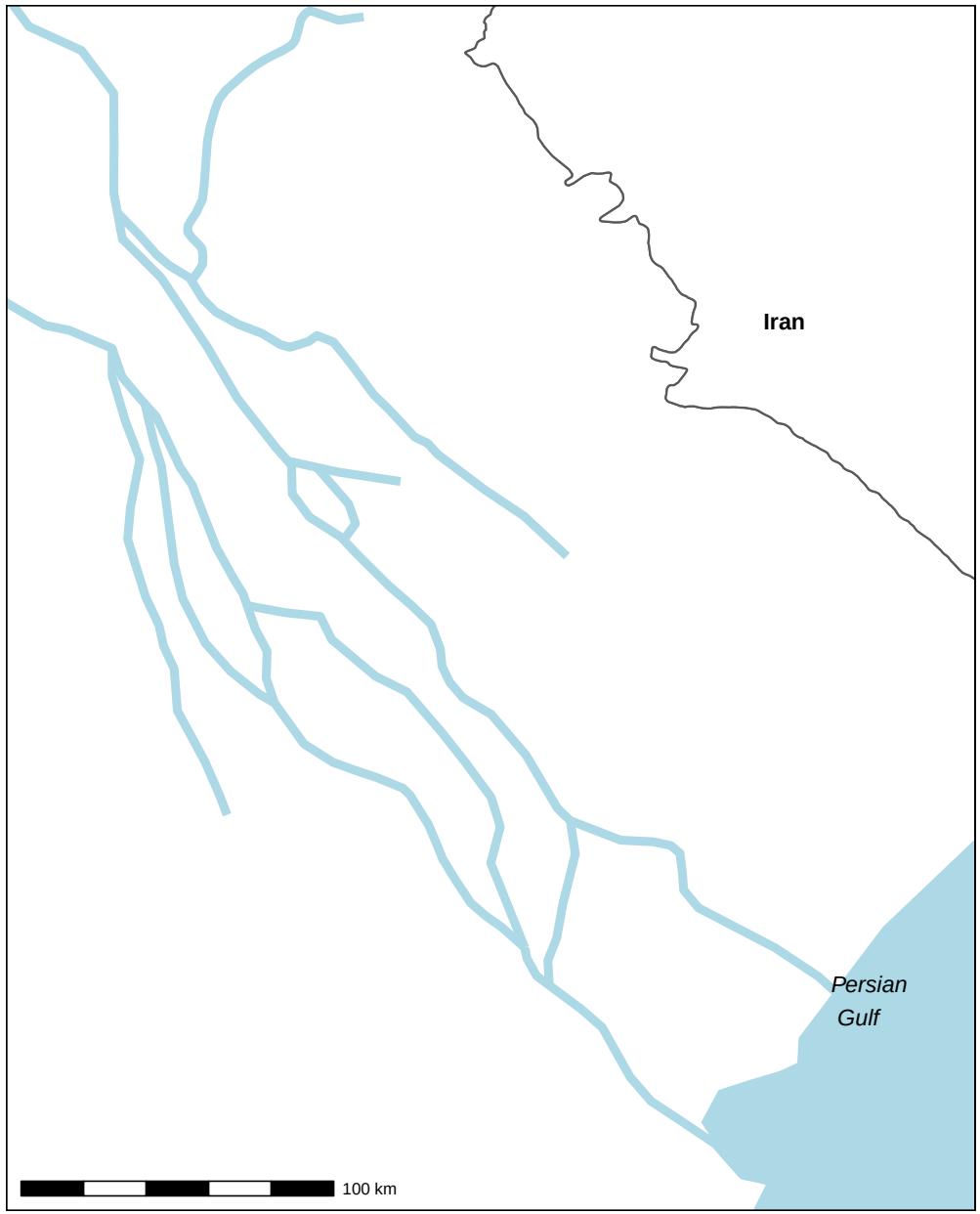
River shift example: break point



River shift example: new equilibrium



River shift example: after



This paper

Empirical strategy: River shifts:

- Euphrates and Tigris reach current position in several shifts
- When a river shifts, incentives for migration, or irrigate through canals

Empirical strategy II: Clusters of theories:

- All else equal, if government forms to provide public goods, then states should form where the river shifted *away*
- Since tax base drops, if government forms to extract, states should form where the river shifted *to*, or where it didn't move

Data: archeological panel dataset (5000BCE - 1918CE):

- Today: Focus on first river shift, panel from 3900 BCE - 2700 BCE
- Data on states, public good provision, taxation and organization of government
- For a 5*5 kilometer grid cell dataset
- I compare grid cells next to a stretch of river that shifted away, to cells that are equidistant from the river after the shift

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Preview of main results:

1) River moving away leads to state formation:

- Treated cells are twice as likely to be part of a state
- The nearest city within that state has more admin buildings

2) River moving away public good provision and tribute:

- Cells more likely to be watered by a canal
- Nearest city more likely to have defensive walls
- Nearest city more likely to collect tribute

3) Interpretation: Early government coordinated

- Location of states consistent with cooperative theories
- Historians' interpretation: 'scaling up' of local household structure
- Government coordinated between social groups
- Data: consistent with evidence from cuneiform tablets

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Literature, Background, Data

Two clusters of theories

Cluster I emphasizes cooperation:

- Locke: individuals 'by their own consents, ... make themselves members of some politic society' (Locke, 1689, p. 62)
- Welfare econ interpretation: Exchange services for taxes (Baumol, 1952)
- Fundamentally driven by externalities and breakdown of cooperation in private provision of public goods (Samuelson, 1954, Bator, 1958, Olson, 1965)

Cluster II emphasizes expropriation:

- The state is a 'formal organisation of power [which] has as its central task the protection ... of the order of stratification' (Fried, 1978, p. 36)
- These theories goes back to Marx and Engels: "the state, that is, an organization of the exploiting class...for the maintenance of its external conditions of production...for the forcible holding down of the exploited class in the conditions of oppression..." (Engels, 1878, p. 314/315).
- But note that this requires some initial imbalance of power

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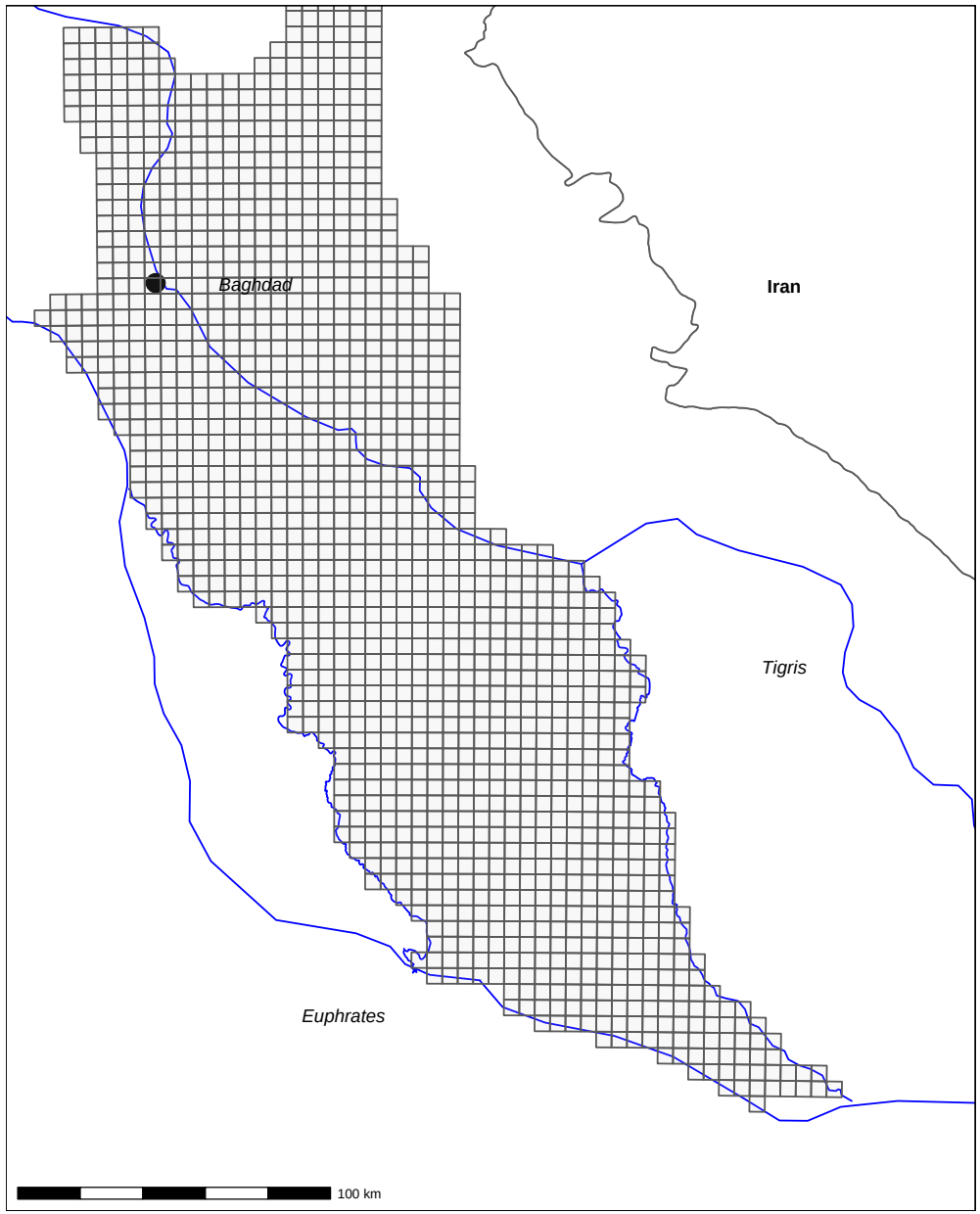
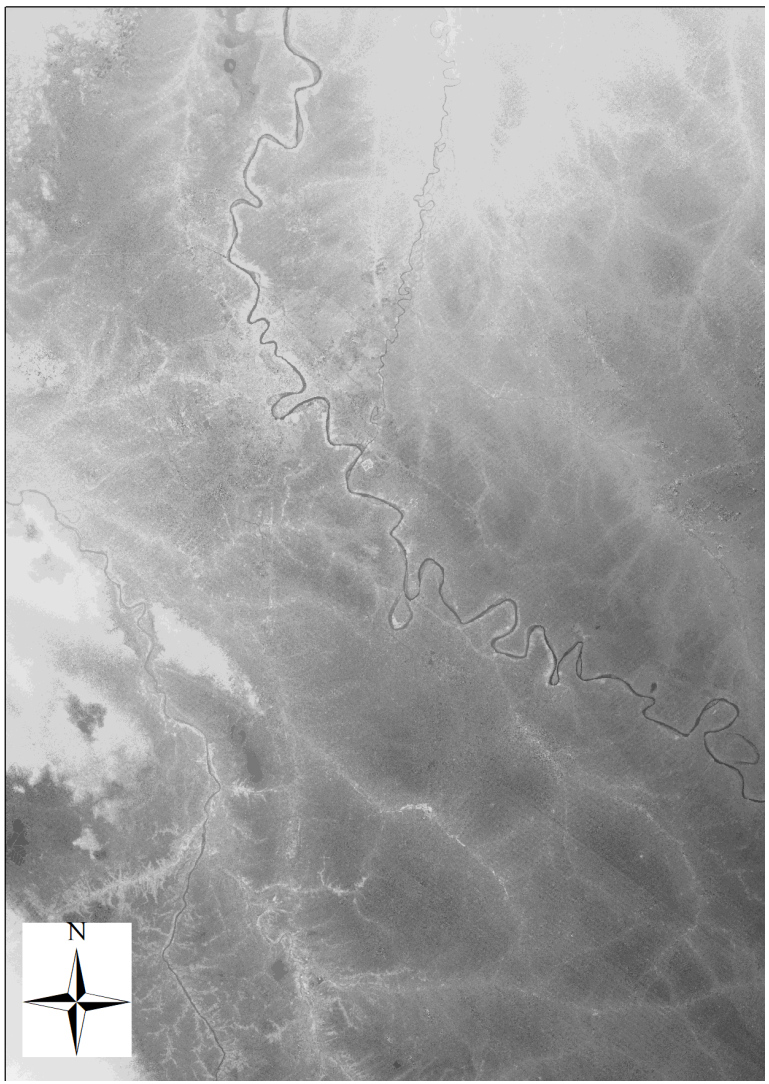
- But note that this requires some initial imbalance of power

Map: sample



Data: Rivers



- Reconstruct historical rivers from paleoclimatology and archaeological literature
- Augmented by satellite pictures
- Shoreline reconstructed by historians

Data: settlement

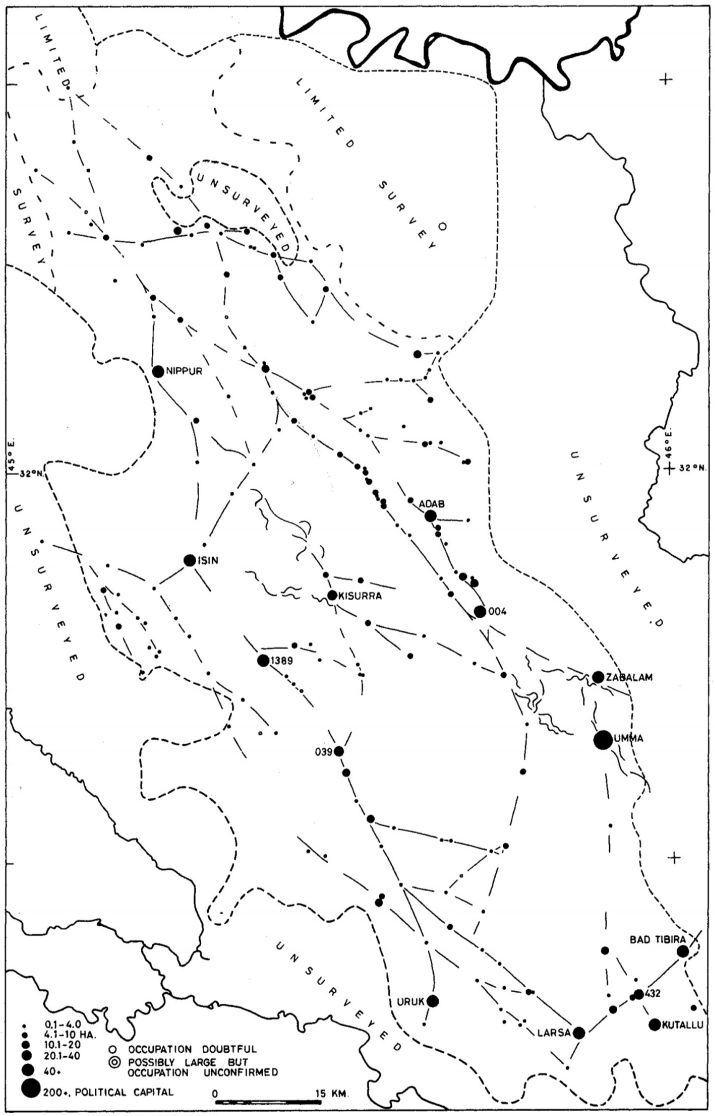


Fig. 33. Old Babylonian period settlement patterns.

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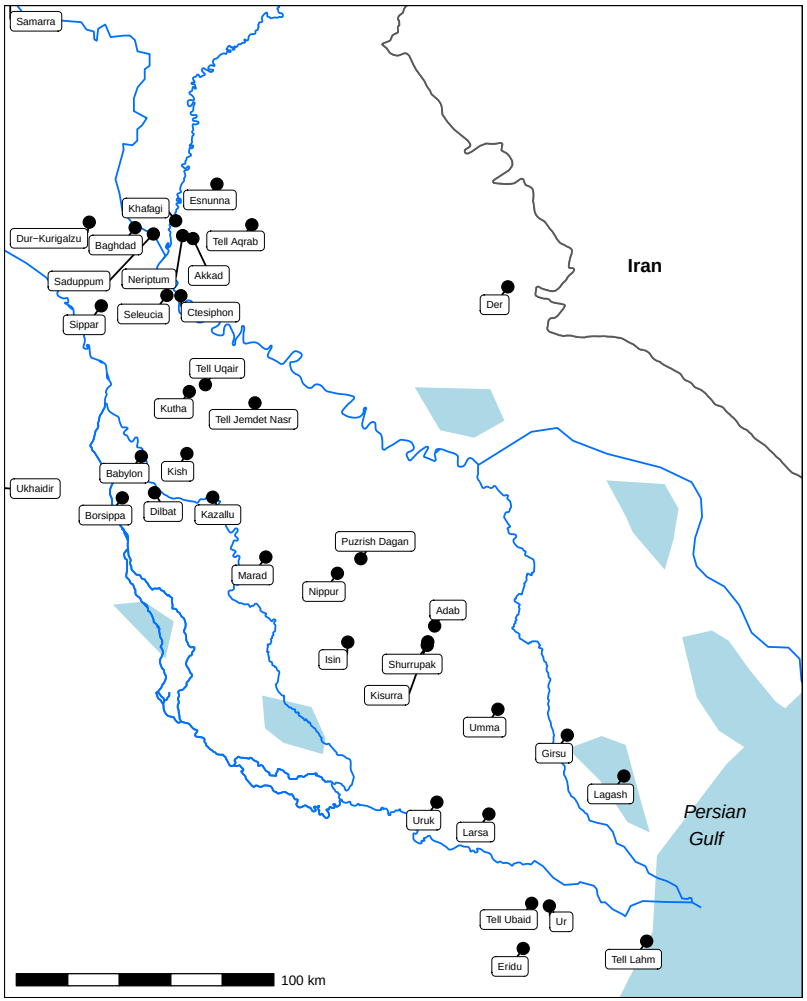
- Southern Iraq has been archeologically surveyed
- Surveys record hamlets to cities
- We digitize the location of each settlement
- Map: example of archeological base map
- Source: Chicago's Oriental Institute (Adams, 1964, 1981, 1984, Adams & Nissen, 1972)

Data: cities



- City: recorded name and larger than approximately 40 hectares
- We record cities from archeological records
- Map: all recorded cities, 5000BCE-1918CE

Data: Buildings and states

Reconstruction of buildings:

- For each city, we record government buildings
- In our context, these are palaces, ziggurats and temples
- Measurement: number of buildings, and their size (m^2)
- Photos: palace in Babylon and ziggurat in Ur

Reconstruction of borders:

- We take borders from Lafont et al. (2017)

Definition of state:

- At least one administrative building in a city + documented historical boundaries

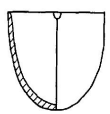
Data: periodization

175 Northeast mound very slightly elevated. Very limited Early Dynastic I, mainly late Early Dynastic–Akkadian, continuing into Larsa period only at south end. Main mound primarily Ur III–Larsa, but with some late Early Dynastic–Akkadian wares, thin Neo-Babylonian–Parthian debris, and much late kiln slag. Surface debris is also found in intervening area between the two mounds, suggesting that they form parts of what was originally a single large settlement.

Archeological periods:

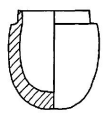
- Dating of finds based on archeological periodization
- Time dimension of our panel is therefore an archeological period (avg. length 225 years)

Type 3, Deep bowl with spout



Site	Ub.	E.U.	L.U.	J.N.	E.D. I
357					
312					

Type 4 Height 8–10 cm
Diameter 8–11 cm

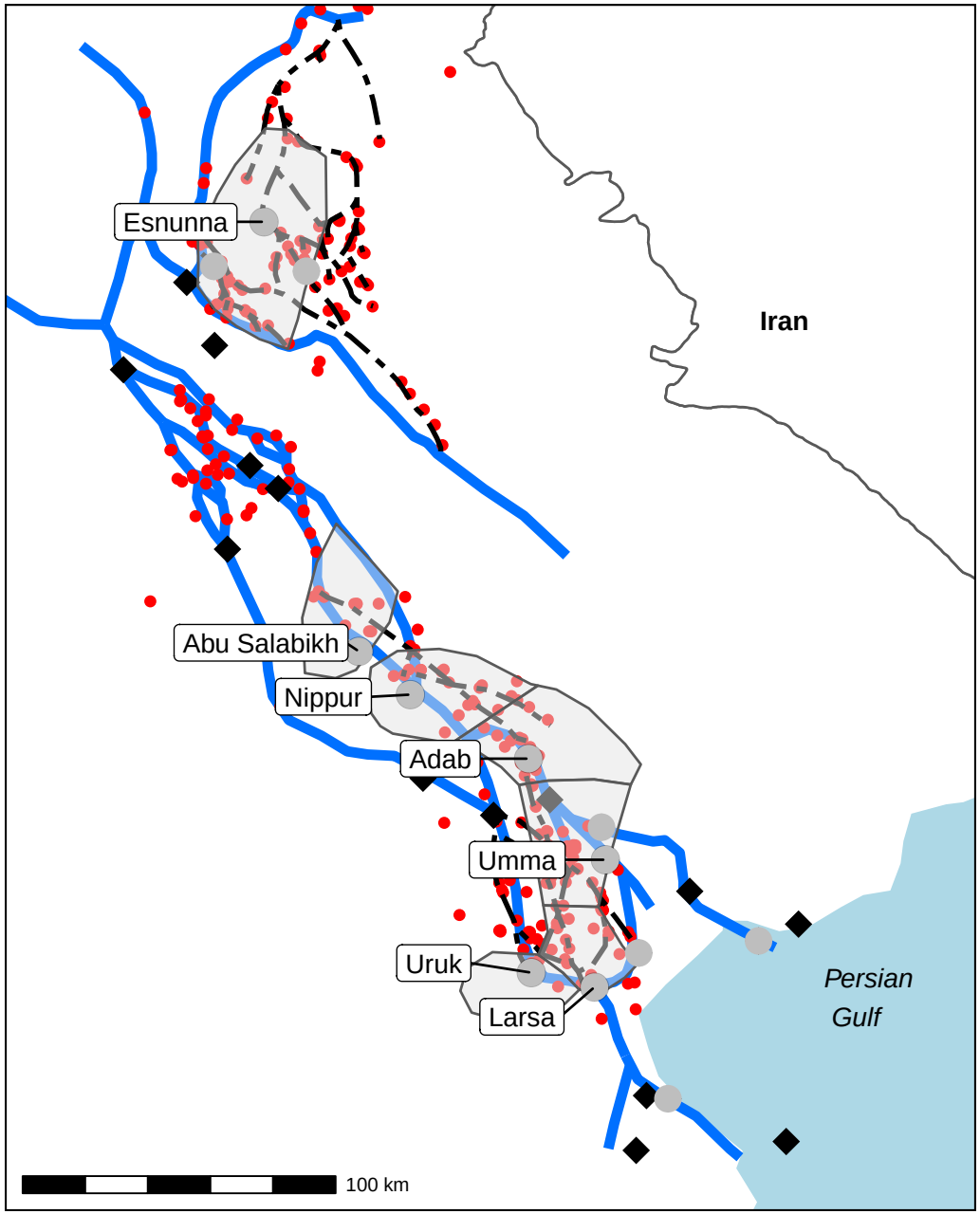


Site	Ub.	E.U.	L.U.	J.N.	E.D. I
137					
185					
262					
162					
306					

How do we know?:

- Periodization by styles and C14
- Survival bias limited by sweep surveys and stratigraphy

Map: cross-section 2700BCE



States, buildings, and settlement:

- City with admin bulding
- City
- Settlement
- State

Water:

- River
- Canal

Empirical approach

River shifts

Rivers shift due to extreme rainfall in Turkey and Syria: Rainfall

- River shift major environmental event, which happens rarely
- Ten shifts over history, six within our sample area
- We study the first river shift in history, in around 2850BCE

River shifts create migrate or stay trade-off: Incentives

- Staying: center of plain, where rivers shift, is productive if irrigated
- When staying, coordination problem in canal building and maintenance
- Coordination may lead to demand for state to provide canals

River shifts are uncorrelated with lagged human activity:

- Today, rivers can be diverted or dammed. Not in the past
- Lagged settlement and canal building are uncorrelated with river shifts

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Treatment: Going from being 'next to' a river to away

- Unit of observation: 5*5 KM grid
- Treatment: grid cells $<$ 5KM from river in $t-1$ to $>$ 5KM
- Control: grid cells that are on/away from the river in both $t-1$ and t

Sample restrictions:

- Rivers shifting closer
- Areas less intensively surveyed

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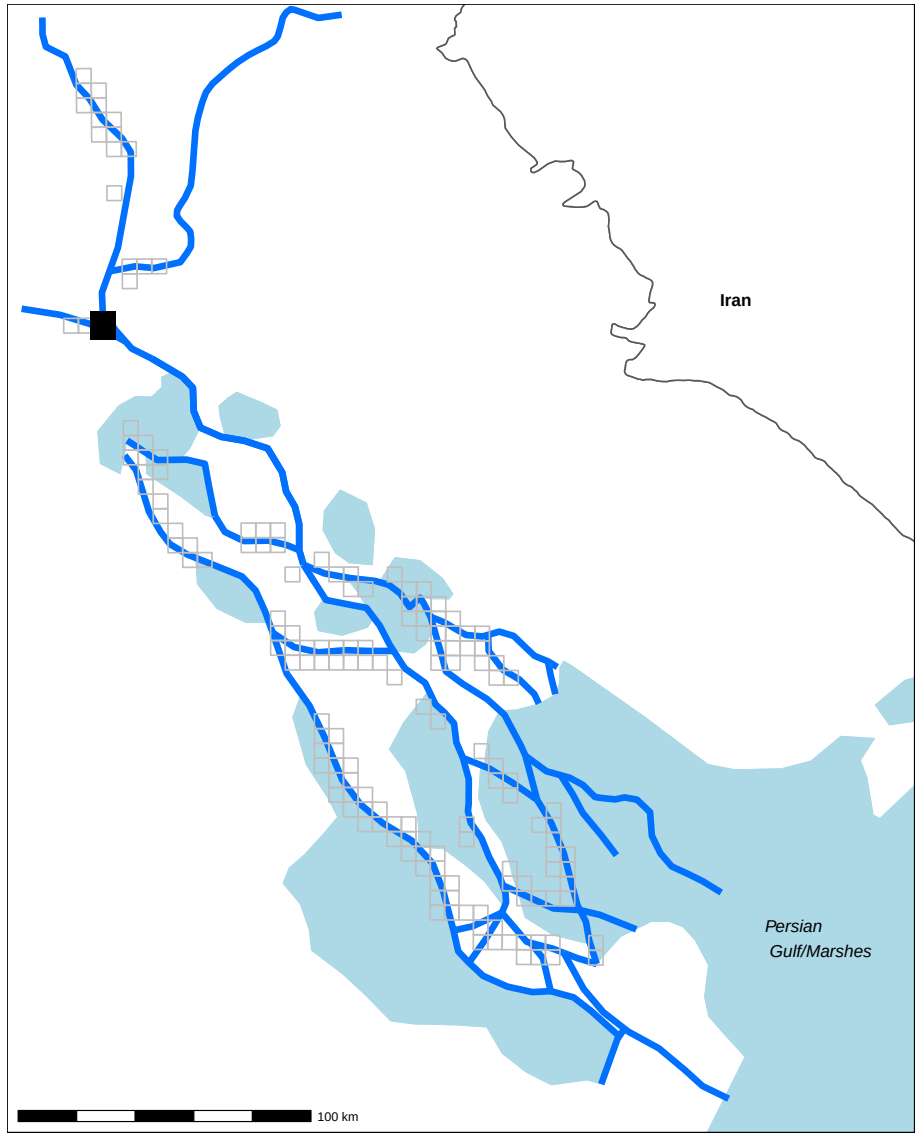
Balance

Dependent variable:	Nr. of settlements		City (yes/no)		Canal (yes/no)	
	lag 1	lag 2	lag 1	lag 2	lag 1	lag 2
	(1)	(2)	(3)	(4)	(5)	(6)
River shift (yes/no)	-0.16	0.06	0.01	-0.01	0.02	0.03
	(0.14)	(0.08)	(0.02)	(0.01)	(0.03)	(0.03)
	[0.14]	[0.08]	[0.00]	[0.00]	[0.02]	[0.04]
Mean dep. var.	0.37	0.29	0.09	0.01	0.21	0.17
Observations	4325	4665	4665	4665	4325	4665
Clusters	933	933	933	933	933	933
Period x archeological excavation	Y	Y	Y	Y	Y	Y
Period x rainfall	Y	Y	Y	Y	Y	Y
Period x temperature	Y	Y	Y	Y	Y	Y
Period x urban	Y	Y	Y	Y	Y	Y

Map: treated cells, before shift



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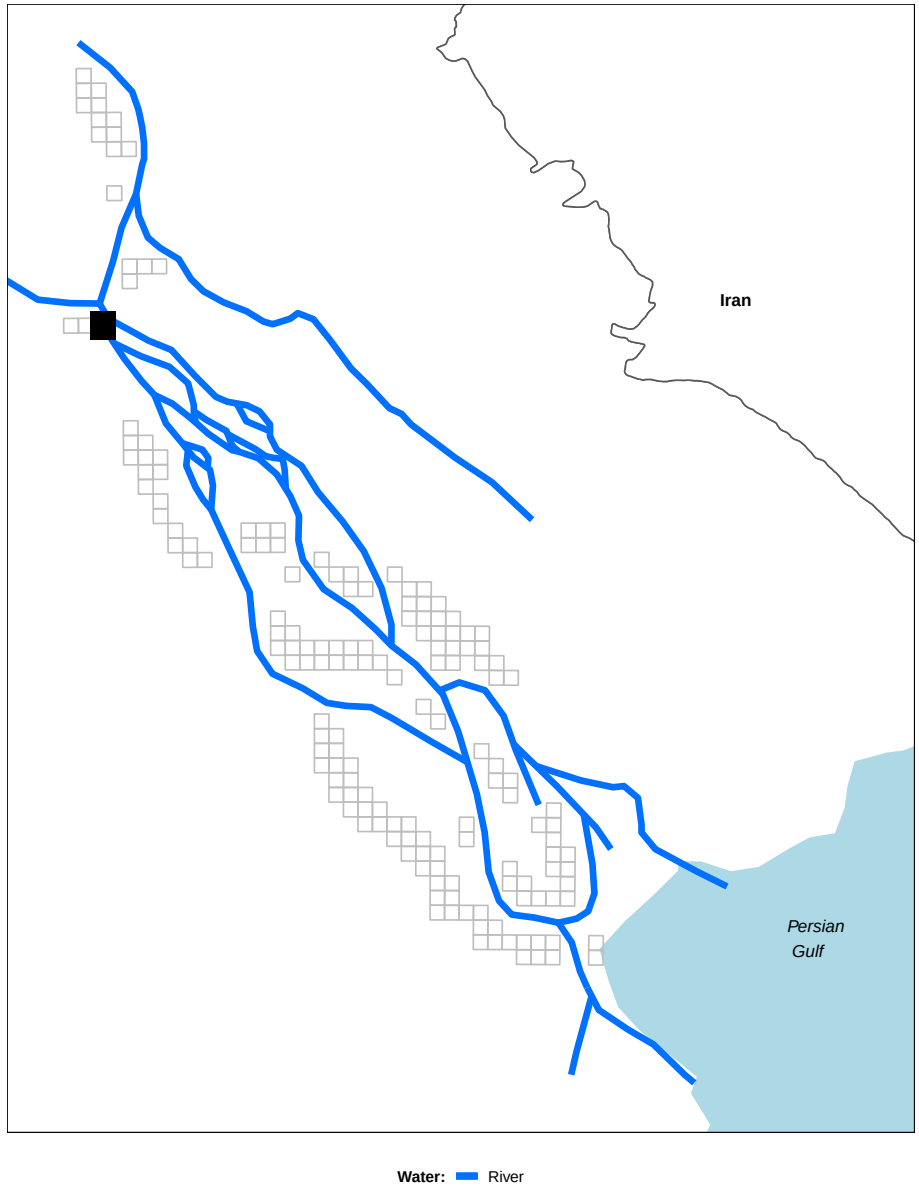
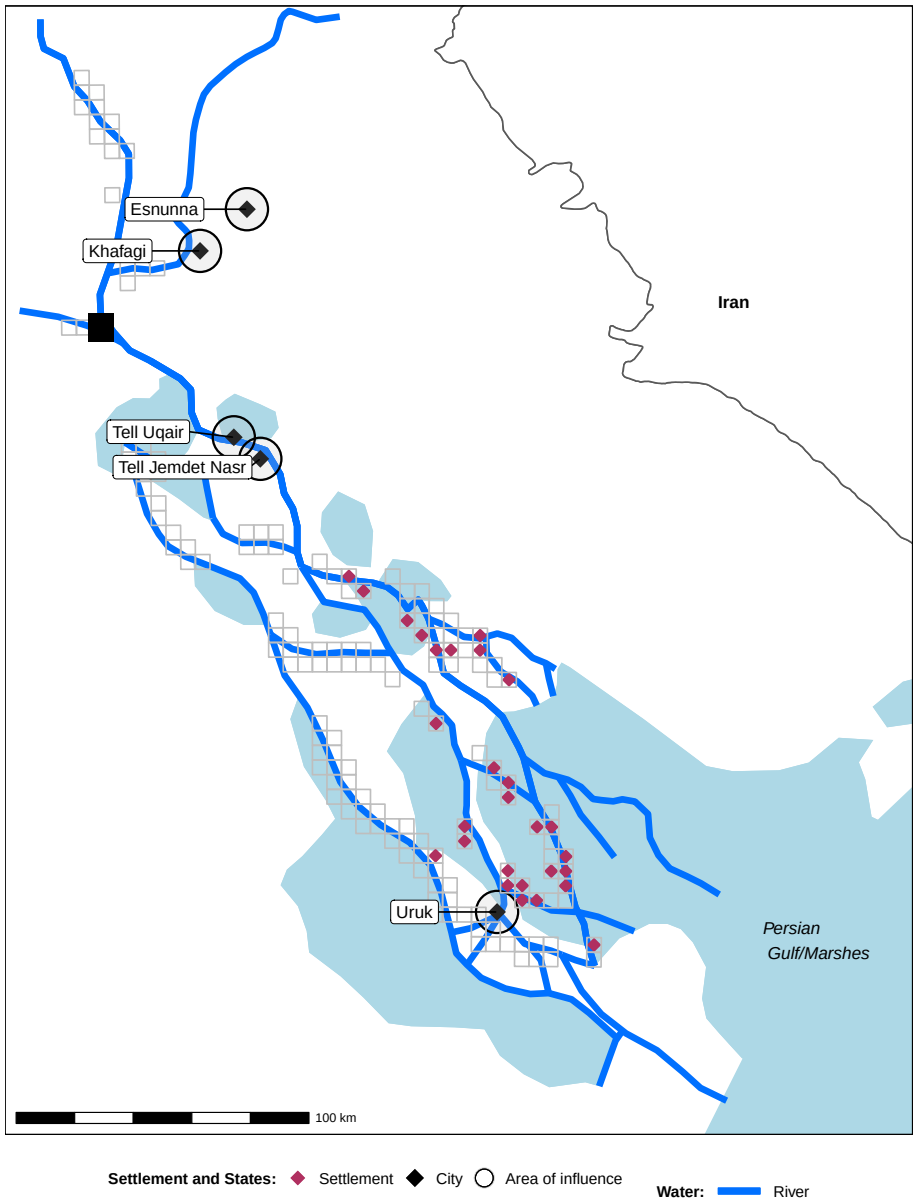
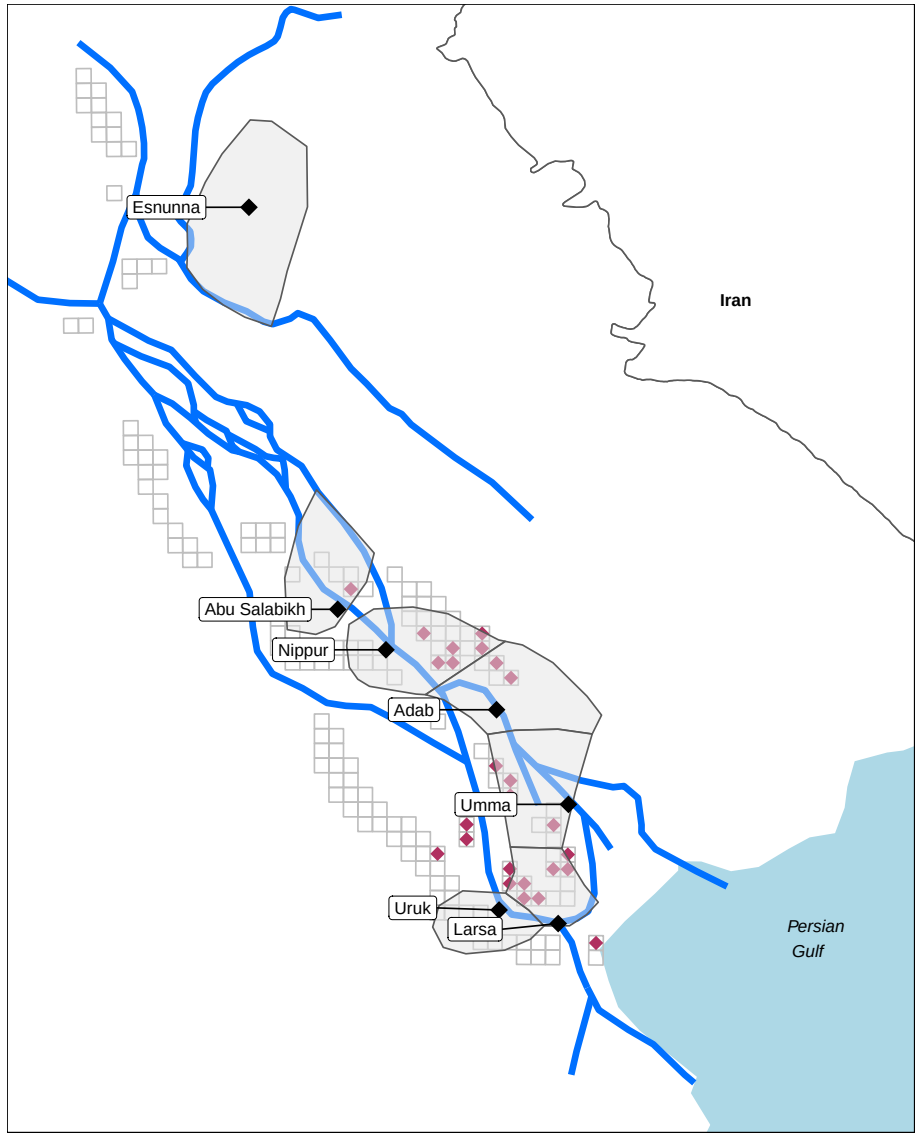


Map: cities and settlement before shift



Map: states and settlement after shift



Estimating equation:

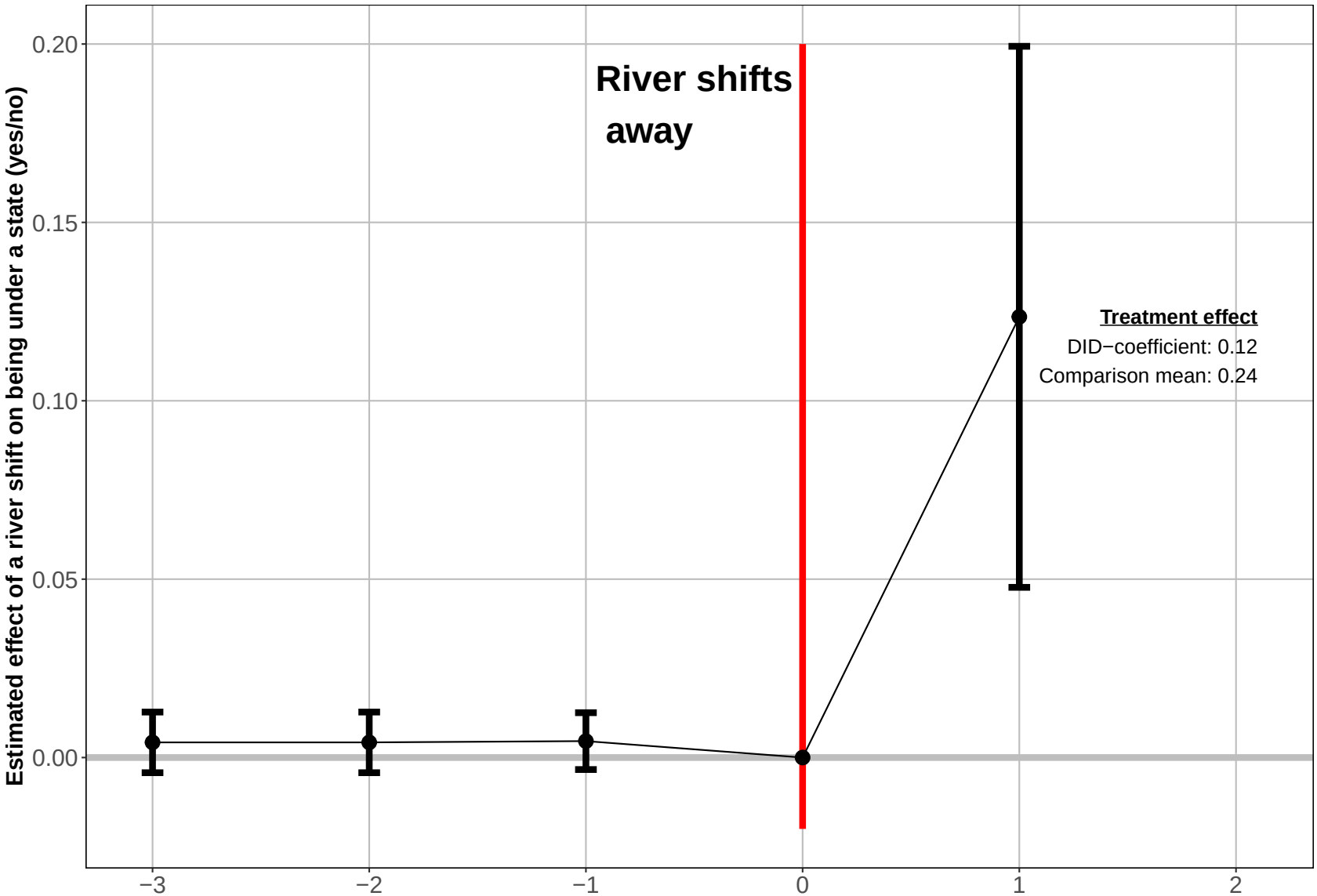
$$Y_{ct} = \sum_{k=0}^{-4} \beta_{tk}^{treatment} \times \mathbb{1}(period_{tk}) \times treated_c + \rho_c + \gamma_t + \upsilon_{ct} + \varepsilon_{ct}$$

- Y_{ct} = outcome variable for grid cell c in period t
- γ_c = grid cell fixed effects (n=1325)
- $treated_{ct}$ = indicator equal to one if river shifts in period $k = 0$
- ρ_c = a vector of period x covariate fixed effects. Covariates are archeological survey, rainfall, temperature, and an indicator for urban status in the last pre-period
- ε_{ct} = standard errors, clustered at grid cell, grid cell + period x nearest city level. We report Conley (1999) errors throughout

- $k = 0$ = treated period, four pre-periods and one post-period

Main results: State formation

Results: State formation



Results: State formation

Dependent variable:	Under city state (yes/no)		New state (yes/no)	Existing state (yes/no)
	(1)	(2)	(3)	(4)
river shift (yes/no)	0.13***	0.16***	0.11***	0.02
	(0.04)	(0.05)	(0.04)	(0.02)
	[0.03]	[0.03]	[0.03]	[0.01]
P-value pre-trend	0.24	0.48	0.26	0.88
Mean dep. var.	0.06	0.12	0.03	0.03
Observations	4636	4393	4636	4636
Clusters	933	933	933	933
Using reconstructed borders	Y	N	Y	Y
Period x archeological excavation	Y	Y	Y	Y
Period x rainfall	Y	Y	Y	Y
Period x temperature	Y	Y	Y	Y
Period x urban	Y	Y	Y	Y

Results: The Social Contract

Results: Government

Dependent variable:	Public good provision (yes/no)		Administration	
	Canal	Wall	Tribute (yes/no)	N. Admin. Build.
	(1)	(2)	(3)	(4)
river shift (yes/no)	0.12***	0.10**	0.22***	0.55***
	(0.03)	(0.04)	(0.06)	(0.16)
	[0.02]	[0.03]	[0.09]	[0.15]
P-value pre-trend	0.78	0.51	0.25	0.79
Mean dep. var.	0.28	0.14	0.19	0.70
Observations	4325	4393	4393	4393
Clusters	933	933	933	933
Period x archeological excavation	Y	Y	Y	Y
Period x rainfall	Y	Y	Y	Y
Period x temperature	Y	Y	Y	Y
Period x urban	Y	Y	Y	Y

Latent coordination problems and state formation

Heterogeneity

Dependent variable:	Under city state (yes/no)				
	(1)	(2)	(3)	(4)	(5)
	Panel I: social returns and costs of canal building				
		Social returns *Population density*		Social costs *Settl. aligned for canals*	
Sample:	*Full sample*	*High*	*Low*	*Aligned*	*Misaligned*
river shift (yes/no)	0.13***	0.18***	0.04**	0.22***	-0.01
	(0.04)	(0.05)	(0.02)	(0.06)	(0.03)
	[0.03]	[0.03]	[0.03]	[0.04]	[0.02]
P-value Chow test coefficient equality		0.10	0.10	0.00	0.00
P-value pre-trend	0.24	0.98	0.10	0.42	0.51
Mean dep. var.	0.06	0.07	0.04	0.08	0.03
Observations	4636	2323	2313	2365	2271
Clusters	933	465	468	477	456
	Panel II: geographic returns and costs of canal building				
		Geographic returns Δ *potential productivity*		Geographic costs *Water flow nearest river*	
Sample:	*Full sample*	*High Δ*	*Low Δ*	*High flow*	*Low flow*
river shift (yes/no)	0.13***	0.16***	-0.05***	0.10**	0.04
	(0.04)	(0.05)	(0.02)	(0.05)	(0.06)
	[0.03]	[0.04]	[0.03]	[0.04]	[0.05]
P-value Chow test coefficient equality		0.00	0.00	0.15	0.15
P-value pre-trend	0.24	0.88	0.66	0.28	0.32
Mean dep. var.	0.06	0.07	0.04	0.08	0.02
Observations	4636	2319	2316	2675	1731
Clusters	933	465	468	535	352
Covariates (all regressions):					
Period x archeological excavation	Y	Y	Y	Y	Y
Period x rainfall	Y	Y	Y	Y	Y
Period x temperature	Y	Y	Y	Y	Y
Period x urban	Y	Y	Y	Y	Y

The organization of the first states

The organization of the state

Innovation of states was to scale up the lineages:

- The 'king' would act just like a head of a household
- Organized as 'series of ... nested households that varied in scale from nuclear families ... to the entire polity' Ur (2014, p. 8)

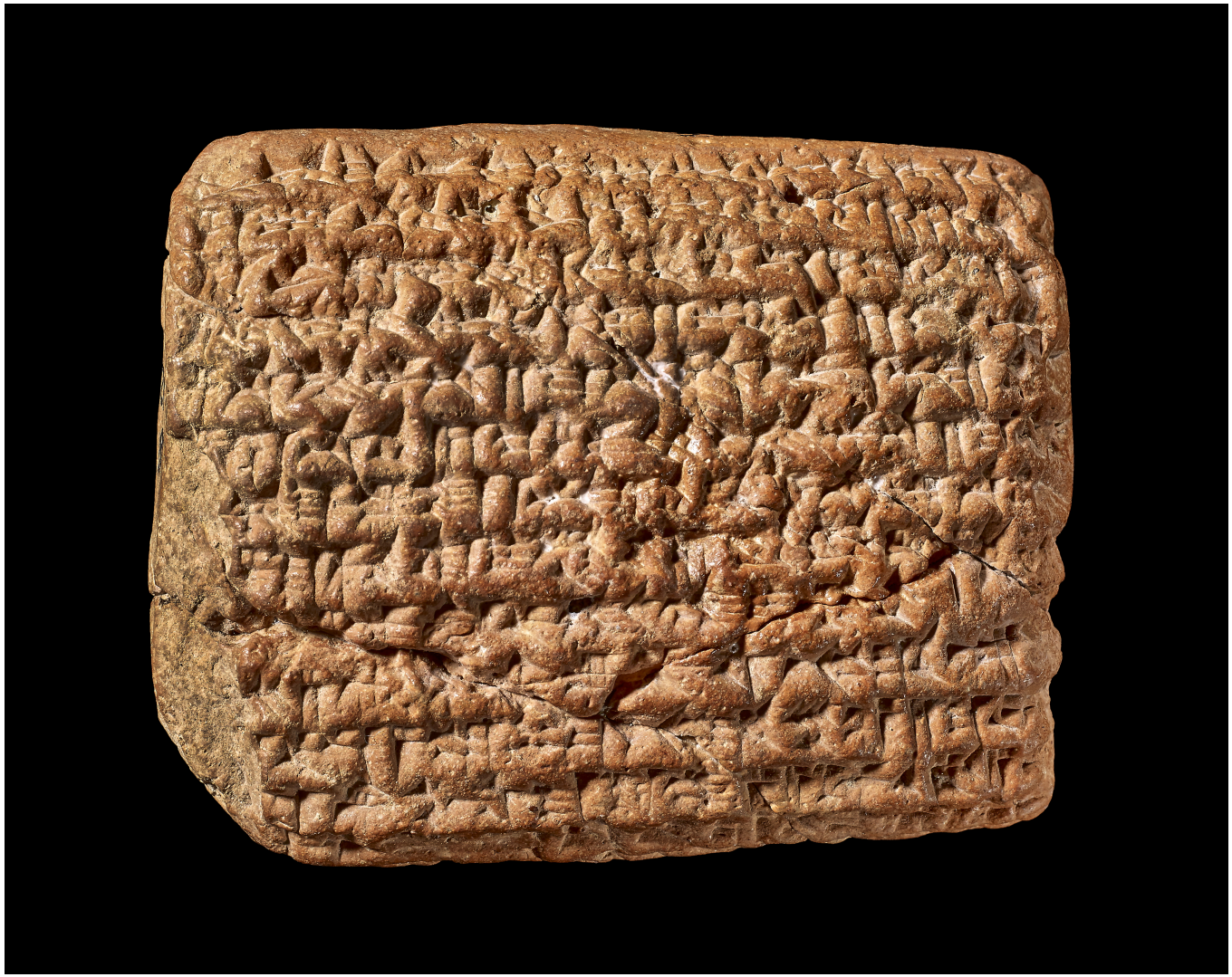
Decentralized implementation of public good provision :

- Ruling lineages had no direct authority over lineage members
- But would coordinate, with a council, and empower local leaders
- "the success of the state was achieved through cooperation with local elites whose longstanding authority within their communities was co-opted by the crown." (Garfinkle, 2021, p. 154)
- And individuals who appeared to have been part of the government "would in fact have been heads of major lineages or groups of lineages, representing their constituencies." (Gibson, 1992, p. 16).

We measure this using a sample of 5,000 cuneiform tablets:

- Cuneiform tablets are government records, excavated across our sample area
- We can trace the frequency of specific terms and how this changes over time
- In particular we focus on 'Head of ruling lineage', and 'lineage head'

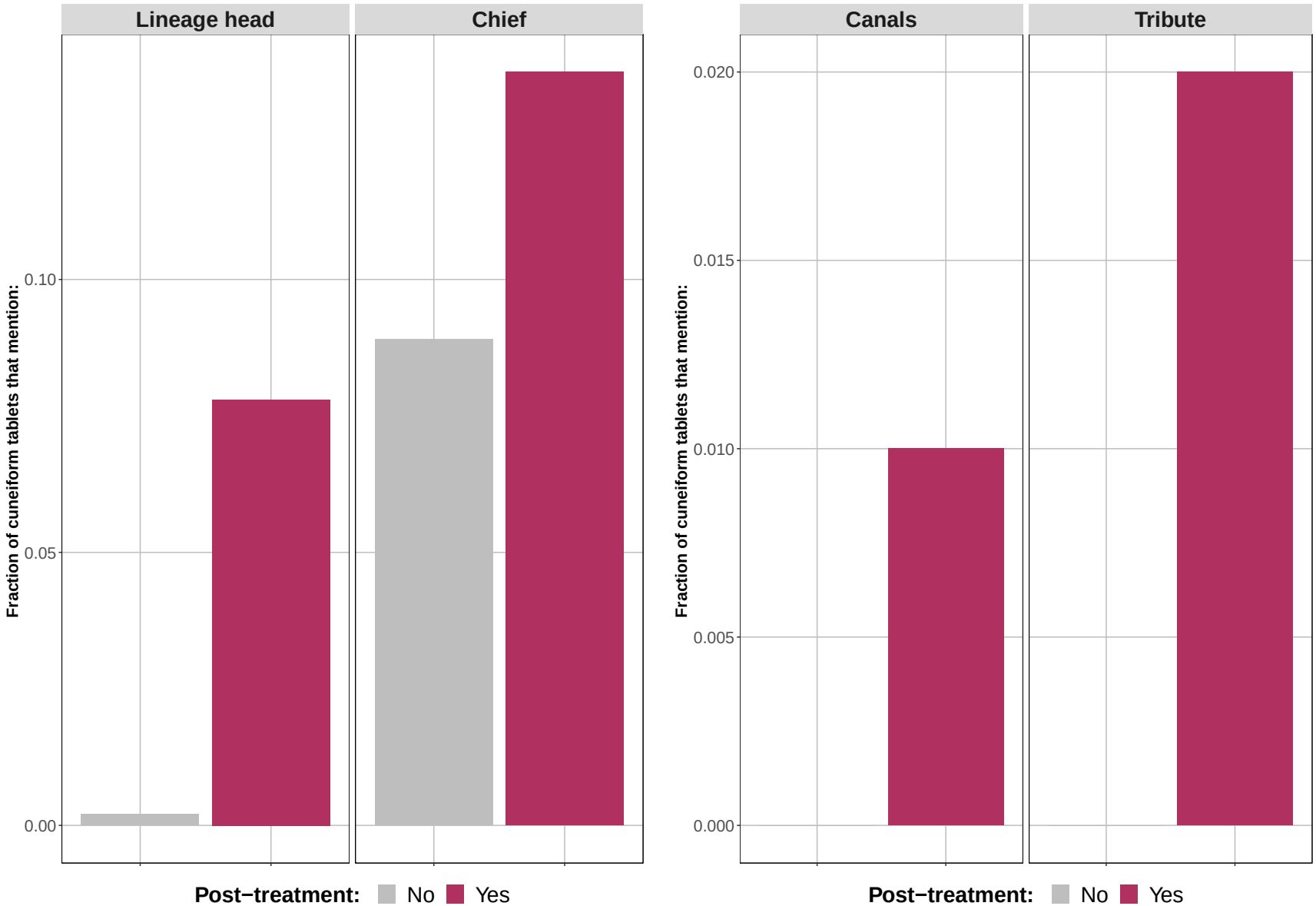
A cuneiform tablet



Sumerian terms

Canal, or part of the irrigation network		
Main canal	i7	i
Main canal	id	id2, id3, id5, idx, id-da
Small canal	pa4	pa5, pa6, pa-bi-zu, pa-re
Small canal	szita3	szi-de2-na, sze-ten-ba, szi-ten-ba, sze-de2-na
Canal intake	ka id2	
Canal reservoir	kun-zi	
Reservoir	kun	ku-un, kun4
Reservoir	nag2-ku5	kab2-ku5, kab2-tar
Reservoir	durunx	
Part of irrigation system	u3-ter	
Irrigation ditch	a-da-ga	
Dam	gesz-kesz2	gesz-kesze2

Results: Tablets



Discussion

Main result: social contract theory of state formation:

- River shifts (away) as natural experiment, incentivizing cooperation and disincentivizing extraction
- Find state formation, public good provision, and tribute payment
- Interpretation: Organized through scaling up of local social structure

These results in relation to other literature:

- Consistent with paper showing factors determining location in the cross-section of states (i.e. Mayshar et al., (2022))
- Less consistent with studies starting from the premise of expropriation (like Carneiro (1970) and tests thereof)
- In paper: What about subsequent shifts? After first states, both expropriation (as state now has power, akin to Sanchez de la Sierra (2017)) but also cooperation likely, as it is today!

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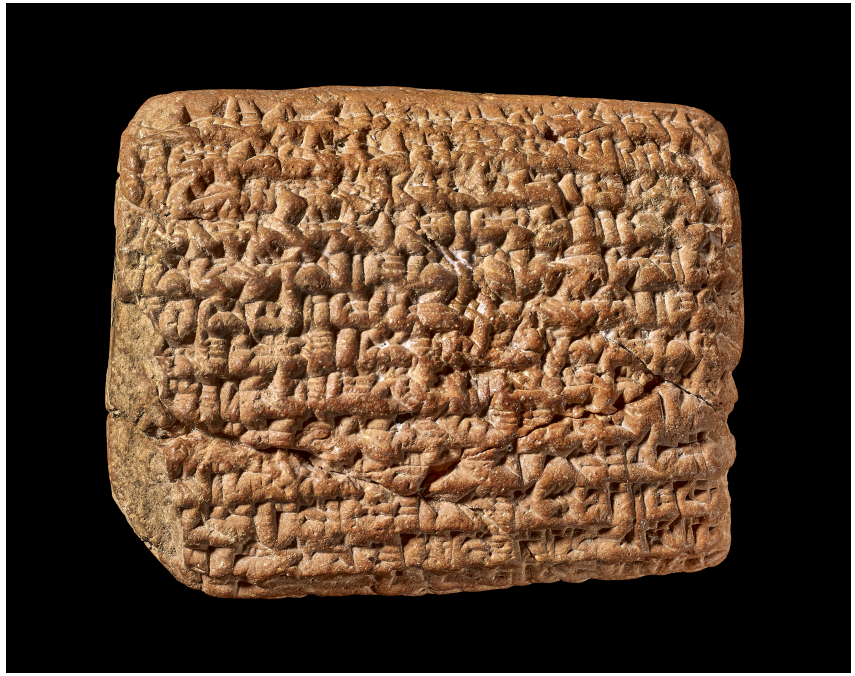
THANK YOU

EXTRA RESULTS

Setting: the social contract



"The gugallu-office for the Borsippa-canal, which is in the **gift** (bīt qīpti) of Nabû-nādin-šumi, the **governor of Borsippa**, the son of Mušēzib-Marduk of the Ibnāya family, **for the land** from the Harru-ša-Bīt-Bēlāya until the border of the estate of Bēl-ēter, son of Ahu-iddin, is at the disposal of Nergal-uballit, son of Nādin of the Hattuēreš family, **for yearly two minas of silver**. Every year, Nergal-uballit **will pay** to Nabû-nādinšumi, the governor of Borsippa, (these) two minas of silver for the gugallu-office. The **sheep** (to be delivered) by the village headmen (hazan āli) [and ...] he shall deliver in the presence of Širiktu. He shall **clothe** him with a [...-]...-garment (?). He shall collect [x] measures (mašīhu) of **dates** for each kurru of land at the expense of the fifty-collective (ina muhhi hanšê) (and) two measures of barley. **He guarantees for guarding the canal and taking care (hâru) of the royal road**. This is in addition to earlier debt-notes of Nabû-nādin-šumi against Nergal-uballit which he might produce for the purpose of settling accounts. (Witnesses, scribe). Bīt-Ina-tēšî-ēter on the Borsippa-canal. 16.7.1 Amīl-Marduk, king of Babylon. He shall pay the silver in monthly installments. The garlic, flax and sesame belong to the governor in addition (to the rest).".

Figure: social contract. Copyright: The Trustees of the British Museum. Return

Rainfall in Turkey and river shifts in Iraq

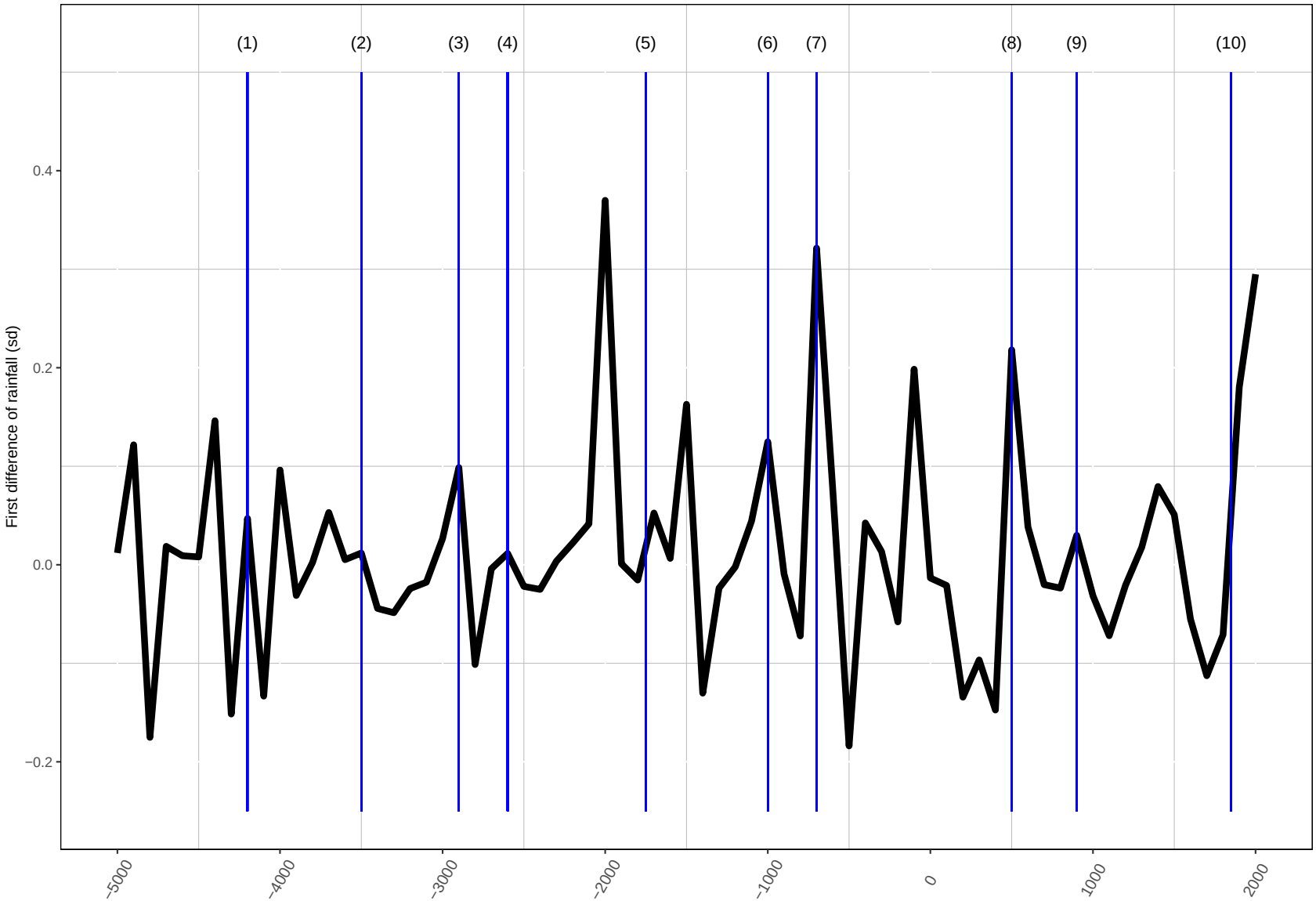


Figure: first difference of standard deviation of rainfall in Turkey. Vertical lines denote river shifts

Return

Results: geography

Dependent variable:	Rainfall (1)	Temperature (2)	Barley Suitability Rainfed (3)	Barley Suitability Irrigated (3)
River shift any distance (yes/no)	-14.84***	15.95***	-13.86***	5.777***
	(0.504)	(0.510)	(0.533)	(0.569)
	[3.754]	[3.399]	[3.636]	[2.733]
Mean dep. var.	11.77	23.15	579.0	3927.1
Observations	1325	1325	1325	1325
R^2	0.343	0.396	0.299	0.0519

Return

Results: balance

Dependent variable:	Settlement density		City (yes/no)		On canal (yes/no)	
	lag 1	lag 2	lag 1	lag 2	lag 1	lag 2
	(1)	(2)	(3)	(4)	(5)	(6)
[1em] River shift (yes/no)	-0.16	0.06	0.01	-0.01	0.02	0.03
	(0.14)	(0.08)	(0.02)	(0.01)	(0.03)	(0.03)
Mean dep. var.	0.37	0.29	0.09	0.01	0.21	0.17
Observations	4325	4665	4665	4665	4325	4665
Clusters	933	933	933	933	933	933
Conley SE	0.14	0.08	0.00	0.00	0.02	0.04
Period x archeological excavation	Y	Y	Y	Y	Y	Y
Period x rainfall	Y	Y	Y	Y	Y	Y
Period x temperature	Y	Y	Y	Y	Y	Y
Period x urban	Y	Y	Y	Y	Y	Y

Return

The collapse under Muslim rule

Society collapsed around 1000CE:

- Settlement collapsed to 5000BCE levels
- Tax revenue, and public good provision disappeared
- This persists: today, Iraqis do not live in the fertile center of the plain

Likely explanation: change in institutions and social contract: (Allen & Heldring, 2018)

- Muslim rulers used slave armies, and engaged in tournament among elites
- Did not rely on local taxes and conscription, no need for social contract
- We follow Blaydes & Chaney (2013) and measure political stability
- Settlement collapses where collective action pressure higher, and Muslim conquest associated with drop in political stability

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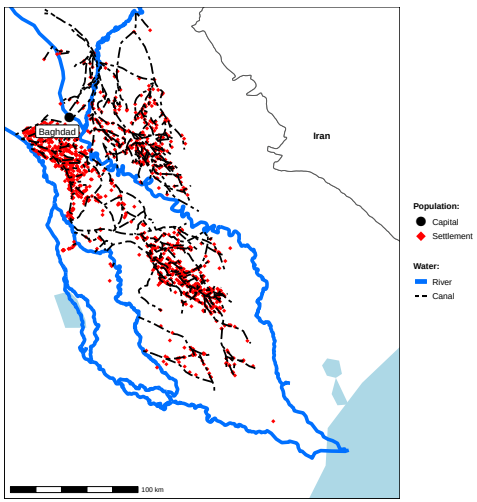
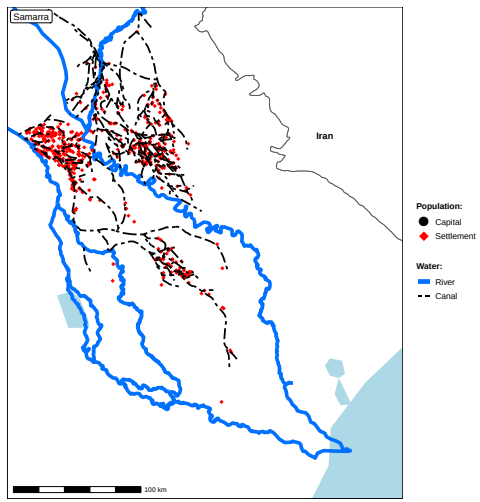
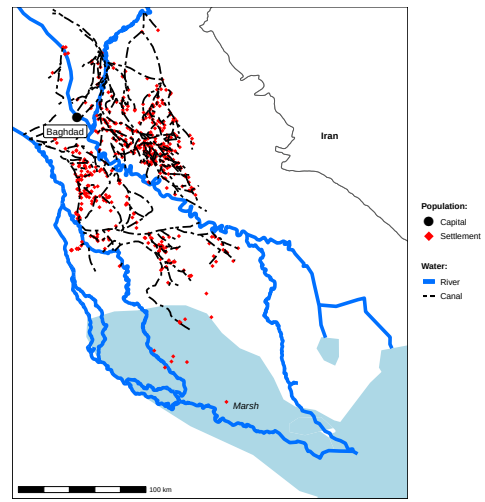
Return

Maps: Islamic collapse

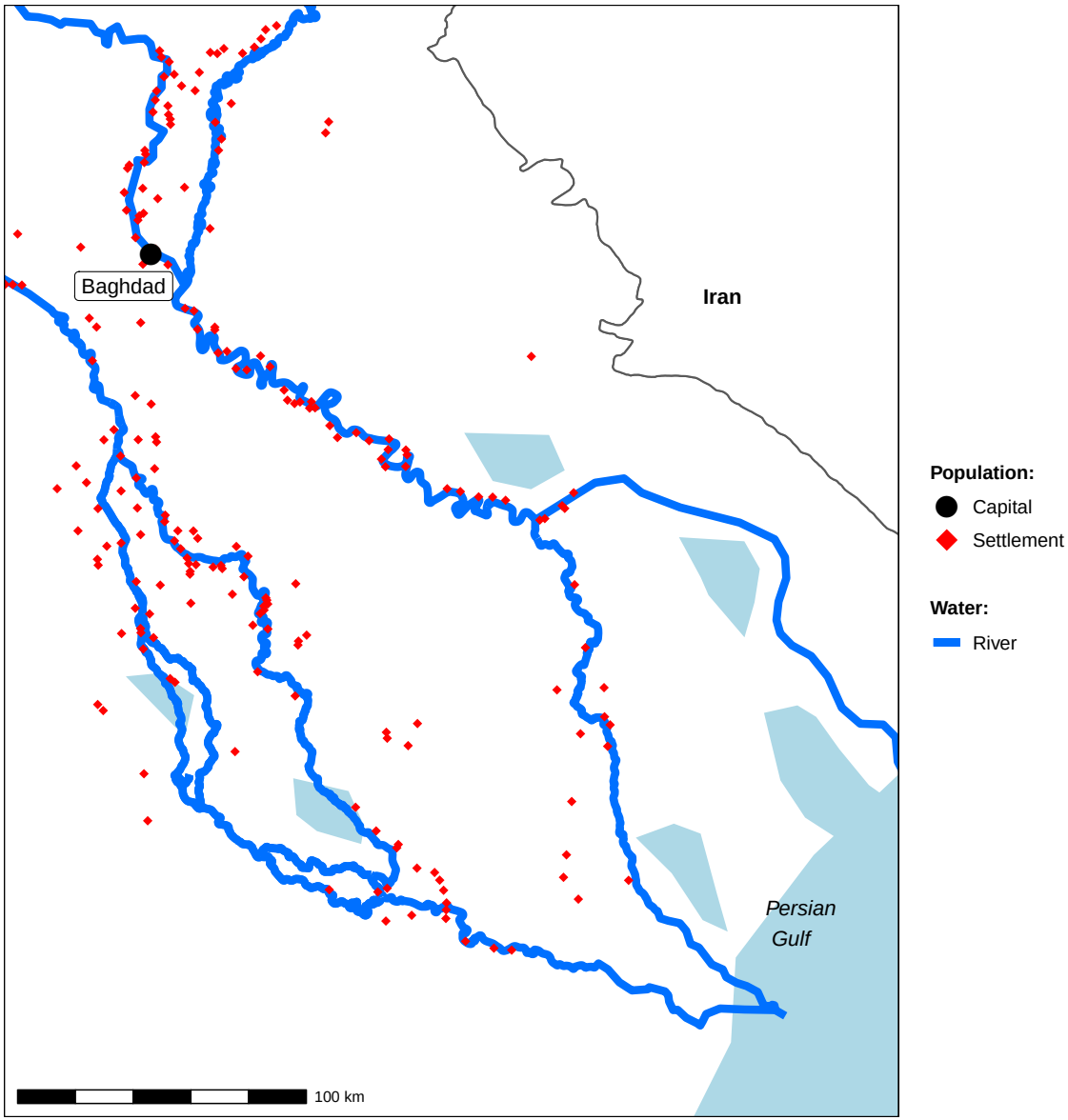






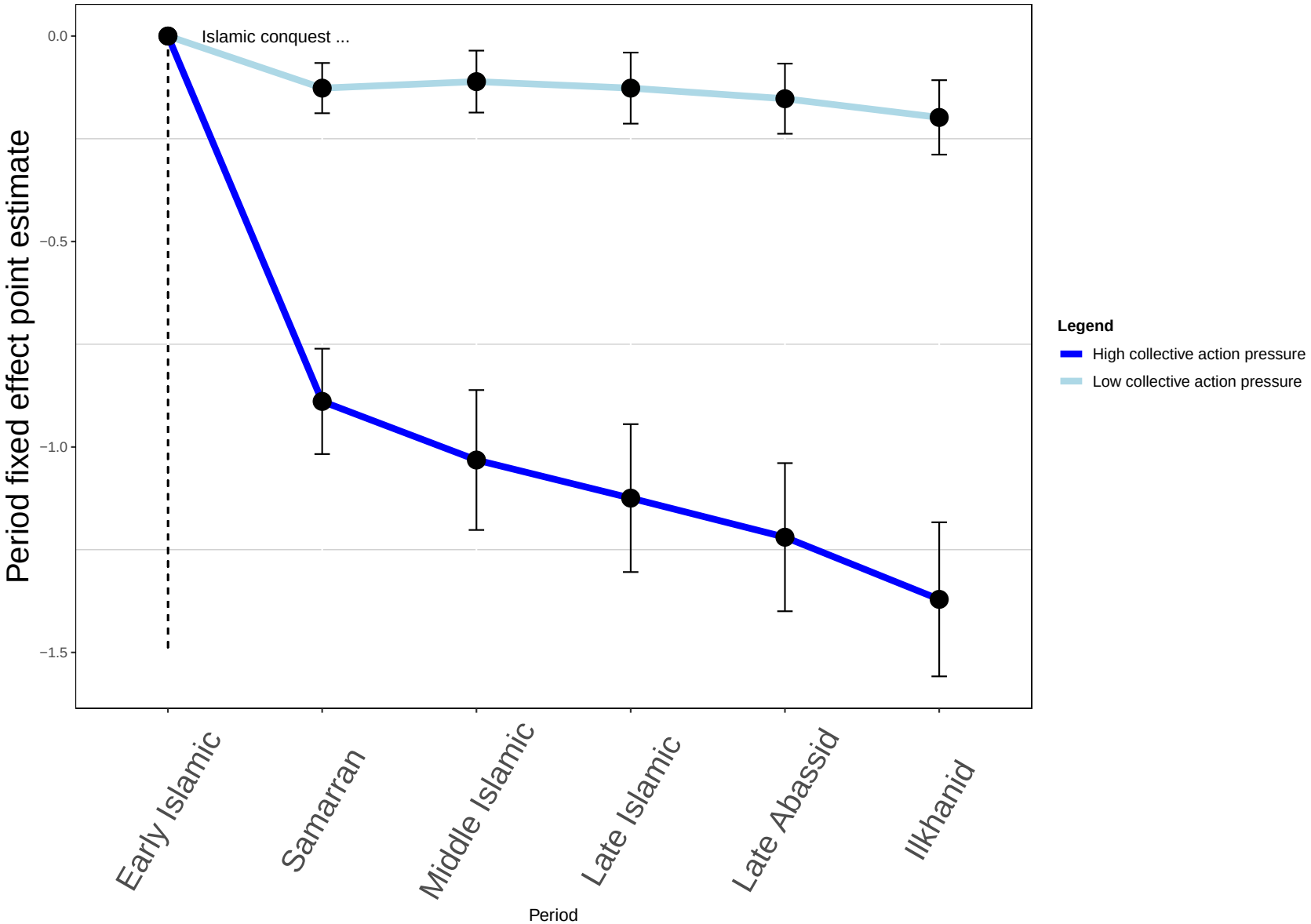
Maps: Settlement, canals and rivers Return

Map: Settlement in 1911



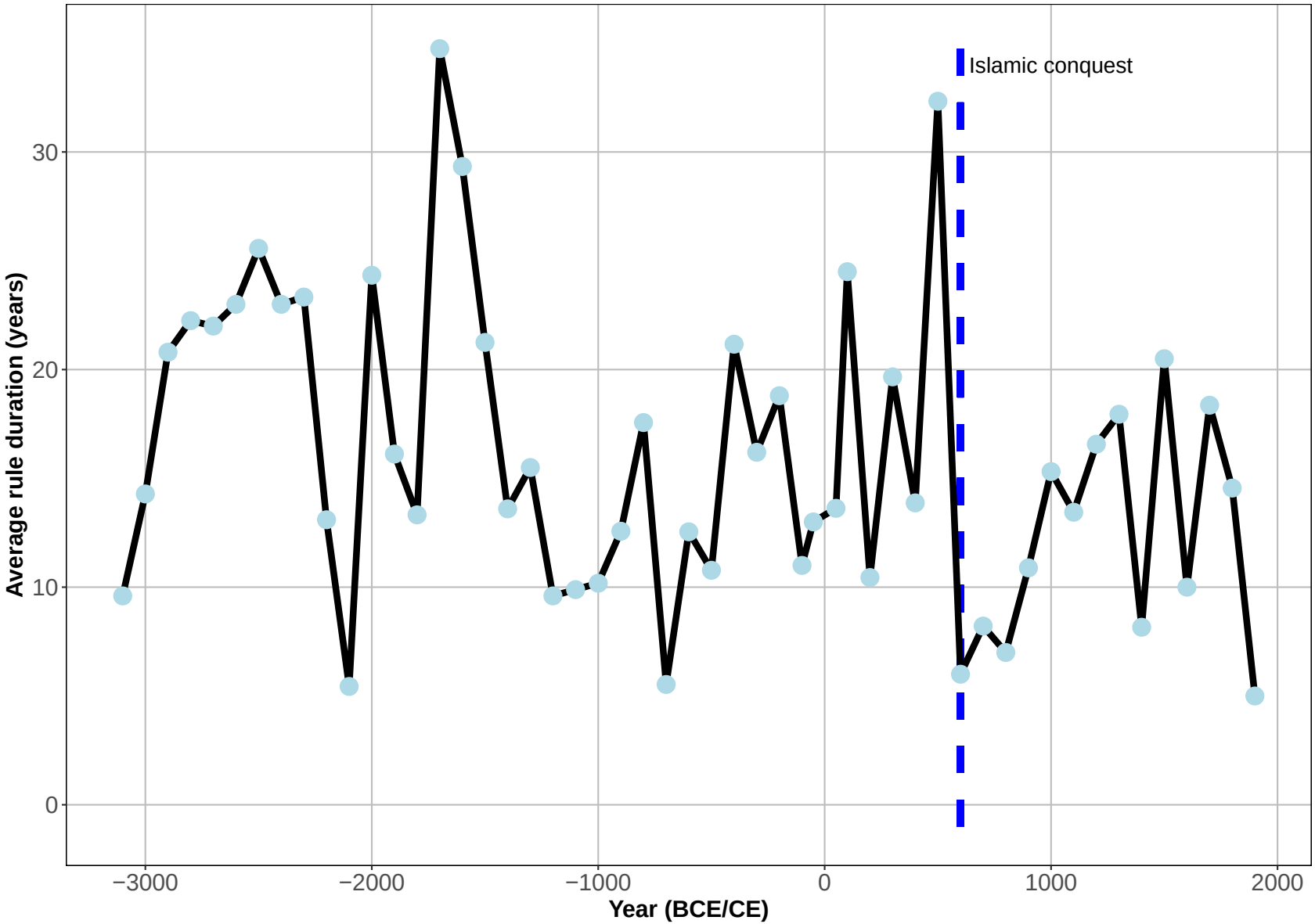
Maps: Settlement, canals and rivers Return

The Islamic collapse



Graph: period fixed effects by period, and distance to river Return

Political stability over time



Graph: average ruler tenure by century Return

Bibliography