

# The Persistent Effect of Rwanda's Nyiginya Kingdom

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# Channels of persistence of historical state capacity

- Broad question: What are the mechanisms driving the persistent effect of historical state capacity in Africa?
- Narrow question: Does long exposure to Nyiginya rule in Rwanda have a persistent effect, and what drives this effect?
- Motivation:
  - Historical state capacity is associated with greater development today (Gennaioli & Rainer, 2007, Michalopoulos & Papaianou, 2013)
  - A variety of mechanisms have been proposed, but so far less emphasis on their relative importance

# Hypotheses

- **Institutions:** Historical states affect modern income through the presence and/or accountability of local government:
  - Historical states establish state infrastructure (Herbst, 2000), and had (weakly) accountable chiefs reducing spoliation today (Gennaioli & Rainer, 2007)
- **Culture:** Historical states affect norms of (mis)trust, cooperation and pro-sociality that persist today
  - Kuba kingdom crowds out pro-sociality today (Lowe et al., 2015). Habsburg Empire positively impact trust in government (Becker et al., forthcoming)
- Other hypotheses: National Government (Mamdani, 1996), social capital (Guiso et al., 2008), and general economic development (Claessen & Skalnik, 1978).

# Empirical setting

1. Exploit 'serendipitous' expansion of precolonial Nyiginya kingdom as a quasi-natural experiment
  2. Measure individual level outcomes in fieldwork experiment across the border created as part of this expansion
- Comparing individuals across a historical national boundary is attractive:
    - Within country analysis keeps national institutions, historical ethnic group (Banyarwanda) and ethnolinguistic fractionalization constant. Furthermore, Nyiginya eventual boundaries coincide with Rwanda's boundaries.
    - Focusing on area around relinquished historical boundary keeps the effects of geography, colonial history and postcolonial shocks constant (but I will test this)

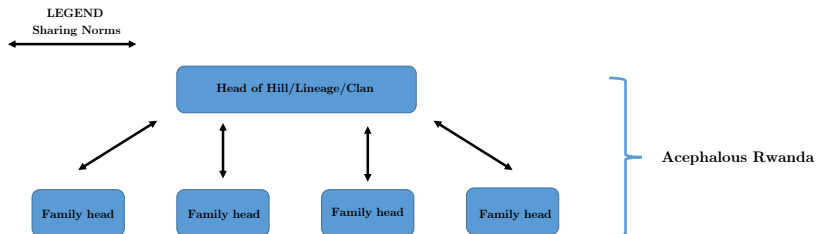
## Structure of contribution

1. Identify the changes to individual's livelihood upon establishment of Nyiginya kingdom (Vansina, 2004) to inform individual level experimental outcome, voluntary tax compliance
2. Reconstruct the expansion of the kingdom to identify fieldwork area
3. Establish individual level persistent effect of the precolonial state
4. Exploit experimental setup to test the role of norms, institutions and other potential sources of persistence
5. Preliminary: Beliefs and norms

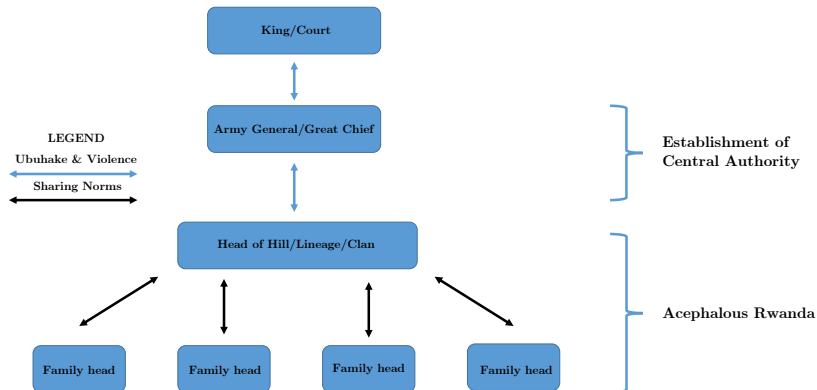
# The historical Nyiginya kingdom

- The kingdom was founded around 1650 by Ndori who uses his wealth in cattle to establish local power base
- After rapid expansion in North-Central Rwanda, the kingdom expands between 1750 and 1898
- The kingdom replaced kinship groups centered around hills. These groups had social inequality based on social status and first-occupier rights, but no political organization
- Kingdom's expansion checked by German colonization

# Pre-Nyiginya Rwanda

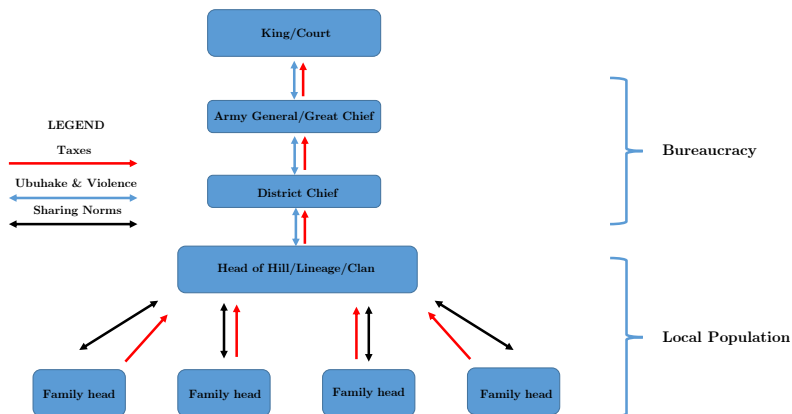


# The establishment of central authority





# Nyiginya bureaucracy



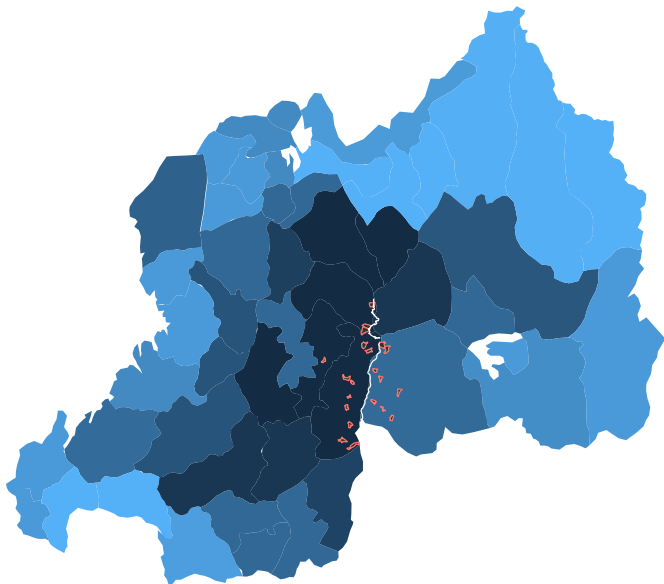
# Nyiginya bureaucracy

- The Nyiginya kingdom was **highly centralized**, comparable to Buganda and more centralized than Burundi:
  - Taxes on labor and output
  - A hereditary standing army
  - Division of labour within the bureaucracy
  - A travelling court of several thousand individuals
- Yet also autocratic and **informal**
  - No legal code, or formal juridical structure
  - No writing, no money
  - Aside from security, no public good provision
  - Virtually no trade, ban on caravans

## Early state expansion

- I focus on a boundary across the Akanyaru river, between a historical district Mayaga, which was incorporated around 1700 and Bugesera, which was incorporated around 1800
- Mayaga was incorporated during or shortly after the reign of Ndori
- Bugesera was a loosely integrated collection of lineages, centered in Gisaka (Vansina, 2004, D'Arianoff, 1952)
- A conflict with the Rundi king forced the chief of Bugesera to abandon the other bank of the river. Local farmers and herders then moved across the river, and the court subsequently formally annexed the territory
- Vansina, 2004, p.155: "The .. conquest ... illustrates the role of serendipity and private initiative in the process."

# Sample, and expansion of the kingdom



# Sampling

1. Select modern districts adjacent to the Akanyaru river:  
Bugusera, Kamonyi, Ruhango and Nyanza
  2. Randomly sample villages from cadastral lists
  3. First visit: Randomly sample participants, informed consent and pick fieldwork date
  4. Second visit: survey and experiment
- 422 participants, 261 on early state side of the river, 161 on other side

# Experimental setting



# Measuring individual level voluntary tax compliance

Specific experimental instructions (based on Hruschka et al. 2014; Lowes et al. 2015):

1. Out of 6000RWF, take a stack of two coins of 100RWF
2. Flip a coin supplied by the enumerator
  - If the coin comes up tails, you do not have to pay tax
  - If the coin comes up heads, you have to pay tax (rate = 25%)
3. Associate an envelope with the government and deposit tax there, money to keep in another envelope
  - Repeat 30 times for each stack of 200RWF
4. Hand one envelope back to the enumerator
5. Keep the other envelope

# Histogram of tax compliance and historic state capacity

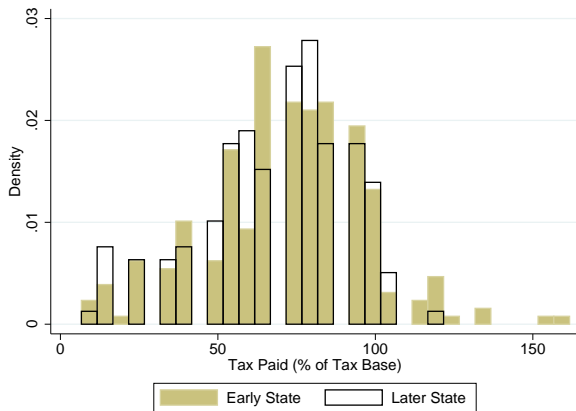


Figure 3: Distributions of voluntary tax contributions on the West side of the Akanyaru river (Early State and the East side).



# Regression evidence

Table 1: Historical Persistence of the Centralized Nyiginya Kingdom

<i>Dependent variable:</i>	Voluntary Tax compliance (% of tax base)					Tax compliance (% of tax base)
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Early State</b>	<b>4.416*</b> (2.609)	<b>8.838**</b> (4.492)	<b>9.424**</b> (4.424)	<b>9.110**</b> (4.513)	<b>9.832**</b> (4.457)	
State history (years)						0.0209* (0.0117)
Mean dependent variable	71.34	71.34	71.34	71.34	71.34	97.41
Sd dependent variable	27.30	27.30	27.30	27.30	27.30	4.92
Demographic controls	N	N	Y	N	Y	N
Distance to Kigali	N	N	N	Y	Y	N
<i>f(location)</i>	None	Latitude & longitude	Latitude & longitude	Latitude & longitude	Latitude & longitude	None
Sample	Individual	Individual	Individual	Individual	Individual	Sector
Observations	416	416	414	416	414	400
$R^2$	0.006	0.013	0.036	0.014	0.038	0.083

Notes: All regressions are estimated using OLS. The unit of observation is the individual respondent in columns (1) and (2), and the administrative sector in column (3). Voluntary Tax compliance is the tax paid by an individual in the random taxation game, divided by the theoretical tax base, 1500 Rwandan Francs. District Tax compliance is the government tax revenue in a particular tax district in 2014 (personal and corporate income tax), divided by the tax base for that district. Early State for the regressions results reported in columns (1) and (2) is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. State history (years) for the regression reported in column (3) is a continuous variable equal to the number of years sector  $s$  has been part of the Rwandan state. Parentheses give heteroskedasticity robust standard errors in columns (1) and (2). In column (3), parentheses give standard errors clustered at the precolonial district level. Demographic controls include age, age squared and a dummy for gender. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Specification checks

Table 2: Specification checks

<i>Dependent variable:</i>	Voluntary Tax compliance (% of tax base)				
	(1)	(2)	(3)	(4)	(5)
<i>Panel I: Placebo</i>					
<b>Panel IA: Move river 1 KM</b>					
Placebo Early State	1.561 (2.660)	3.706 (4.428)	2.583 (4.245)	4.878 (4.539)	3.912 (4.401)
<b>Panel IB: Move river 5 KM</b>					
Placebo Early State	1.544 (3.095)	6.896 (6.098)	6.727 (6.012)	6.711 (6.208)	6.451 (6.113)
<i>Panel II: Alternative versions <math>f(\text{location})</math></i>					
<b>Panel IIA: Linear Spline in distance to Akanyaru</b>					
Early State	4.416* (2.609)	9.692** (4.365)	9.495** (4.343)	9.221** (4.308)	9.037** (4.280)
<b>Panel IIB: Linear Spline, latitude &amp; longitude</b>					
Early State	4.416* (2.609)	10.33** (4.606)	10.70** (4.561)	11.34** (4.762)	11.03** (4.667)
Demographic controls	N	N	Y	N	Y
Distance to Kigali	N	N	N	Y	Y
Observations	416	416	414	416	414

Notes: All regressions are estimated using OLS. The unit of observation is the individual respondent in columns (1) and (2), and the administrative sector in column (3). Voluntary Tax compliance is the tax paid by an individual in the random taxation game, divided by the theoretical tax base, 1500 Rwandan Francs. District Tax compliance is the government tax revenue in a particular tax district in 2014 (personal and corporate income tax), divided by the tax base for that district. Early State for the regressions results reported in columns (1) and (2) is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. State history (years) for the regression reported in column (3) is a continuous variable equal to the number of years sector  $s$  has been part of the Rwandan state. Parentheses give heteroskedasticity robust standard errors. Demographic controls include age, age squared and a dummy for gender. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Potential Confounders: Geography, pre-existing wealth differences and migration

- Underlying geography may influence attractiveness for establishing a state
- Pre-existing wealth differences may influence attractiveness for establishing state
- Sorting across the boundary, although potentially an outcome of the establishment of the historical state, may confound the analysis

# Balance checks

Table 3: Robustness: balance

<i>Sample:</i>	Within 10 KM of Akanyaru	Within 5 KM of Akanyaru	Within 3 KM of Akanyaru	Experimental sample
	(1)	(2)	(3)	(4)
<b>Terrain Elevation</b>				
Early State	36.08*** (4.895)	15.77** (6.792)	4.775 (8.720)	32.88 (20.37)
$R^2$	0.126	0.033	0.004	0.119
<b>Banana Suitability</b>				
Early State	-0.693 (0.872)	0.114 (1.113)	0.379 (1.307)	-3.565 (3.519)
$R^2$	0.002	0.000	0.001	0.051
<b>Archeological sites</b>				
Early State	0.00596 (0.00904)	-	-	-
$R^2$	0.001	-	-	-
Observations	391	164	82	21

Notes: All regressions are estimated using OLS. The unit of observation is a village. Columns restrict the sample to lie within modern district bordering the Akanyaru river, and to successively narrower bands around it. Terrain Elevation is the elevation in meters under the centroid of the village the respondent lives in. Banana Suitability is the geographical suitability for growing bananas in the respondent's village. Archeological sites is the number of archeological sites indicating prehistorical human settlement from ? and ?. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Balance checks

Table 5: Migration: balance

<i>Dependent variable:</i>	Migrant dummy	Outside migrant dummy
	(1)	(2)
Early State	-0.0486 (0.0503)	0.0534 (0.0439)
Observations	420	422
$R^2$	0.002	0.004

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Migrant dummy is an indicator equal to one if the respondent is a migrant. Outside migrant dummy is an indicator variable equal to one if the respondent immigrated into the sample area. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Robustness

Table 4: Geography

<i>Dependent variable:</i>	Voluntary Tax compliance (% of tax base)	
	(1)	(2)
Early State	9.543** (4.504)	10.64** (5.311)
Terrain Elevation	-0.0139 (0.0300)	
Banana Suitability		0.0697 (0.222)
Demographic controls	Y	Y
f(location)	Y	Y
Observations	414	414
$R^2$	0.039	0.039

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Voluntary Tax compliance is the tax paid by an individual in the random taxation game, divided by the theoretical tax base, 1500 Rwandan Francs. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. Terrain Elevation is the elevation in meters under the centroid of the village the respondent lives in. Banana Suitability is the geographical suitability for growing bananas in the respondent's village. Demographic controls include age, age squared and a dummy for gender. Extended individual controls include an indicator variable equal to one if the respondent self-identifies as the household head, and an indicator variable equal to one if the respondent is married. Migration controls include an indicator equal to one if the individual immigrated into the sample village, and a variable measuring the number of years of residence in the sample village, conditional on having migrated.  $f(\text{location})$  is a vector of latitude and longitude. Every regression includes distance to Kigali as a covariate. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

Table 6: Migration

<i>Dependent variable:</i>	Voluntary Tax compliance (% of tax base)	
	(1)	(2)
Early State	9.617** (4.504)	9.813** (4.482)
Migrant dummy	-1.753 (2.751)	
Outside migrant dummy		0.278 (2.895)
Demographic controls	Y	Y
f(location)	Y	Y
Observations	414	414
$R^2$	0.039	0.038

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Voluntary Tax compliance is the tax paid by an individual in the random taxation game, divided by the theoretical tax base, 1500 Rwandan Francs. Migrant dummy is an indicator equal to one if the respondent is a migrant. Outside migrant dummy. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. Demographic controls include age, age squared and a dummy for gender.  $f(\text{location})$  is a vector of latitude and longitude. Every regression includes distance to Kigali as a covariate. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

## Channels: Norms and Institutions

- The random taxation game measures tax compliance in the presence of a monetary incentive to keep the endowment, under full anonymity and impunity. This setup up is motivated by the bureaucratic structure of the Nyiginya kingdom
- I therefore hypothesize that the effects observed so far work through norms internal to the respondents
- It may be that, however, the presence and/or quality of local political institutions is different
- The next sections test balance of various measures of local institutions, and include these measures as controls

# Institutions: balance

Table 7: State Presence: balance

<i>Sample:</i>	Historical Sample	Experimental Sample
	(1)	(2)
<b>Local government office dummy</b>		
Early State	-0.00766 (0.00796)	-0.160 (0.293)
$R^2$	0.000	0.101
<b>Police office dummy</b>		
Early State	0.0116 (0.00936)	0.200 (0.187)
$R^2$	0.003	0.176
<b>Distance to nearest local government office</b>		
Early State	304.6 (370.3)	451.6 (538.6)
$R^2$	0.073	0.129
<b>Distance to nearest police office</b>		
Early State	-4271.2*** (1327.0)	-3594.2** (1701.7)
$R^2$	0.333	0.446
Population in 2002	Y	Y
Sector area	Y	Y
Observations	880	21

Notes: All regressions are estimated using OLS. The unit of observation is a village. Columns restrict the sample to lie within precolonial districts bordering the Akanyaru river, and to the experimental sample. Local government office dummy is an indicator variable equal to one if village  $v$  has a sector office (column (1)) or a cell office (column (2)) within its boundaries. Police office dummy is an indicator variable equal to one if village  $v$  has a police station within its boundaries. Distance to nearest local government office is the distance in meters to the nearest sector office (column (1)) or cell office (column (2)). Distance to nearest police station is the distance in meters to the nearest police office. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.



# Institutions and norms

Table 8: Modern State Presence

<i>Dependent variable:</i>	Voluntary Tax compliance (% of tax base)			
	(1)	(2)	(3)	(4)
Early State	9.715** (4.439)	12.97*** (4.560)	9.508** (4.574)	10.20** (4.432)
Local government office dummy	1.718 (2.943)			
Police office dummy		-16.36* (8.330)		
Distance to local government office			0.000570 (0.00148)	
Distance to police office				0.000186 (0.000398)
Demographic controls	Y	Y	Y	Y
f(location)	Y	Y	Y	Y
Observations	414	414	414	414
$R^2$	0.039	0.047	0.039	0.039

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Government office dummy is an indicator variable equal to one if a sample village has a sector or cell office. Voluntary Tax compliance is the tax paid by an individual in the random taxation game, divided by the theoretical tax base, 1500 Rwandan Francs. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. Demographic controls include age, age squared and a dummy for gender. f(location) is a vector of latitude and longitude and individual level regressions include a North-South river segment fixed effect. Sector Area is the area of the sector containing an individual's village. f(location) is a vector of latitude and longitude. Every regression includes distance to Kigali as a covariate. Every regression includes distance to Kigali as a covariate. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Local accountability: balance

Table 9: Local accountability: balance

<i>Sample:</i>	Historical Sample	Experimental Sample
	(1)	(2)
<b>Corruption</b>		
Early State	1.603* (0.936)	1.537 (1.085)
Population in 2002	Y	Y
Sector area	Y	Y
$R^2$	0.072	0.249
<b>Nr. of call to reach local government</b>		
Early State		-0.404 (1.100)
Population in 2002		N
Sector area		N
$R^2$		0.007
Observations	808	21

Notes: All regressions are estimated using OLS. The unit of observation is a village. Columns restrict the sample to lie within precolonial districts bordering the Akanyaru river, and to the experimental sample. Corruption is the number of individuals convicted for corruption from sector  $s$  containing village  $v$ . Nr. of calls to reach local government is the number of business-hour calls necessary to reach the lowest level government employee in the village in December 2015. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Local accountability and norms

Table 10: Local accountability

<i>Dependent variable:</i>	Voluntary Tax compliance	
	(1)	(2)
Early State	9.917** (4.398)	9.968** (4.470)
Corruption	-0.0989 (1.611)	
Nr. calls to reach local government		0.402 (0.733)
Demographic controls	Y	Y
f(location)	Y	Y
Observations	414	414
$R^2$	0.038	0.039

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Corruption is the number of individuals convicted for corruption from sector  $s$  containing village  $v$ . Voluntary Tax compliance is the tax paid by an individual in the random taxation game, divided by the theoretical tax base, 1500 Rwandan Francs. Corruption involving government employee is the number of individuals convicted for corruption while employed in sector  $s$  containing village  $v$ . Nr. of calls to reach local government is the number of business-hour calls necessary to reach the lowest level government employee in the village in December 2015. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. Demographic controls include age, age squared and a dummy for gender. f(location) is a vector of latitude and longitude. Every regression includes distance to Kigali as a covariate. Province fixed effects indicate fixed effects at the level of the modern administrative province. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Social capital and religiosity: balance

Table 11: Civil society: balance

<i>Dependent variable:</i>	Social Capital	Monthly church attendance
	(1)	(2)
Early State	0.0404 (0.124)	-0.0409 (0.558)
Observations	420	420
$R^2$	0.000	0.000

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Social capital is the number of civil society organizations a respondent is a member of. Monthly church attendance is the number of times the respondent went to church in the last full month preceding the survey date, September or October 2014. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Altruism: balance

Table 16: Altruism: balance

<i>Dependent variable:</i>	Contributed to Agaciro as a person	Contributed to Agaciro as a community	Amount shared local gov't employee	Amount shared national gov't employee
	(1)	(2)	(3)	(4)
Early State	-0.0466 (0.0372)	0.0240 (0.0356)	6.592 (16.58)	-31.60 (21.81)
Observations	420	420	422	422
$R^2$	0.004	0.001	0.000	0.006

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Contributed to Agaciro as a person is an indicator variable equal to one if a respondent reports to have contributed to the Agaciro development fund. Contributed to Agaciro as a person is an indicator variable equal to one if a respondent reports to have contributed to the Agaciro development fund as part of a community contribution. Amount shared with local gov't employee is the amount that a respondent shared in a dictator game with an anonymous local government employee as the receiver. Amount shared with local gov't employee is the amount that a respondent shared in a dictator game with an anonymous national government employee as the receiver. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

## Further channels

- Claesssen and Skalnik (1978) hypothesize that historically more centralized places were richer and these differences persist. Using data on Income and education in years, I find no support for this hypothesis as a channel
- The Nyiginya bureaucracy may have interacted with the colonial state, and this may drive the results (Blouin, 2014). Using data on the presence of the colonial coffee sector, I find no support for this hypothesis as a channel
- Precolonial state capacity has predictive power for the local intensity of the 1994 Rwandan genocide (Heldring, 2015). Using data on the number of convicts of genocide crimes, I find this result within the experimental sample too.
- I am working on expectations of future public good provision using cadastral maps of proposed projects
- I find no evidence of present public goods (hospitals and schools) as channels

# Taking stock

Table 15: Competing channels

<i>Channels considered:</i>	Norms	Norms and competing channels	<i>p-value of coefficient difference</i>
	(1)	(2)	(3)
<b>Local government</b>			
Early State	9.832** (4.457)	10.20** (4.432)	0.9352
Distance to police office		0.000186 (0.000398)	
<b>Accountability of local government</b>			
Early State	9.832** (4.457)	9.822** (4.454)	0.9405
Nr. of call to reach local gov't		0.879 (1.416)	
<b>Social Capital</b>			
Early State	9.832** (4.457)	9.729** (4.440)	0.8291
Social Capital		-2.211** (0.995)	
<b>Income</b>			
Early State	9.832** (4.457)	9.829** (4.462)	0.8404
Eq. daily income (RWF)		-0.0000157 (0.0000737)	
Demographic controls	Y	Y	
f(location)	Y	Y	
Observations	414	414	

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Corruption involving government employee is the number of individuals convicted for corruption while employed in sector *s* containing village *v*. Nr. of calls to reach local government is the number of business-hour calls necessary to reach the lowest level government employee in the village in December 2015. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Norms and beliefs

- Perhaps Rwandan hold beliefs about the merits of the state that are different in places with longer exposure to centralized rule (Di Tella et al. (2007), but also Codere (1962)).
- Although norms and beliefs may interact in complicated ways, I will present some evidence on attitudes towards government more generally from my survey, and on tax compliance specifically using the WVS.



# Conclusion

- Using the expansion of the Nyiginya kingdom as a natural experiment, the results in this paper suggest:
  - There is a persistent effect of being exposed to Nyiginya rule
  - This effect works through persistent norms, rather than institutions, social capital or altruism
  - Beliefs appear to be specific to the norm, rather than forward looking

# Social capital, religiosity and norms

Table 12: Civil Society

<i>Dependent variable:</i>	Voluntary Tax compliance (% of tax base)	
	(1)	(2)
Early State	9.729** (4.440)	9.376** (4.538)
Social Capital	-2.211** (0.995)	
Monthly church attendance		-0.251 (0.242)
Demographic controls	Y	Y
f(location)	Y	Y
Observations	414	414
$R^2$	0.048	0.041

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Voluntary Tax compliance is the tax paid by an individual in the random taxation game, divided by the theoretical tax base, 1500 Rwandan Francs. Social capital is the number of civil society organizations a respondent is a member of. Monthly church attendance is the number of times the respondent went to church in the last full month preceding the survey date, September or October 2014. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. Demographic controls include age, age squared and a dummy for gender. f(location) is a vector of latitude and longitude. Every regression includes distance to Kigali as a covariate. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Income and education: balance

Table 13: Income and education: balance

<i>Dependent variable:</i>	Eq. Daily Income (RWF)	Education in years
	(1)	(2)
Early State	-273.9 (639.3)	1.088*** (0.335)
Observations	420	420
$R^2$	0.001	0.023

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Eq. Daily income is the equivalent daily income for a respondent in RWF. Education in years is the number of years the respondent went to school. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.

# Income, education and norms

Table 14: Income and Education

<i>Dependent variable:</i>	Voluntary Tax compliance (% of tax base)	
	(1)	(2)
Early State	9.829** (4.462)	9.795** (4.448)
Eq. Daily income (RWF)	-0.0000157 (0.0000737)	
Education in years		-0.489 (0.356)
Demographic controls	Y	Y
f(location)	Y	Y
Observations	414	414
$R^2$	0.038	0.042

Notes: All regressions are estimated using OLS. The unit of observation is an individual respondent. Voluntary Tax compliance is the tax paid by an individual in the random taxation game, divided by the theoretical tax base, 1500 Rwandan Francs. Eq. Daily income (RWF) is the equivalent daily income for a respondent in RWF. Education in years is the number of years the respondent went to school. Early State is an indicator equal to one if a respondent lived to the East of the Akanyaru river in October 2014. Parentheses give heteroskedasticity robust standard errors. Demographic controls include age, age squared and a dummy for gender. f(location) is a vector of latitude and longitude. Every regression includes distance to Kigali as a covariate. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, \*\*\* at the 1 percent level.