

State Capacity and Violence: Evidence from the Rwandan genocide*

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Abstract

Exploiting local variation in state capacity within Rwanda I investigate the link between state capacity and violence. Using a disaggregated measure of the intensity of the 1994 Rwandan genocide, I establish that greater local state capacity led to greater conflict intensity. I proxy modern state capacity with its precolonial counterpart, measured by the total time a district was incorporated in the precolonial kingdom. This ‘duration of incorporation’ measures the cumulative effect of the centralizing forces in the kingdom and acts as a proxy for state capacity. Since the kingdom expanded through conquest and consolidated through patronage relations revolving around cattle, I instrument the duration of incorporation with the geographical suitability for cattle. This strategy establishes a causal interpretation of the main result. State capacity, while usually associated with greater public good provision and higher GDP, played a central role in the mass killings in Rwanda.

Keywords: State capacity, violence, Rwanda.

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1 Introduction

State capacity matters for development (Besley and Persson, 2010; Acemoglu, 2005; Herbst, 2000). Whereas a strong state raises taxes, provides public goods and is able to put down insurgency and civil conflict (Acemoglu et al., 2010; Fearon and Laitin, 2003; Rotberg, 2002), weak states often fail to establish a monopoly of violence, let alone provide public goods¹. Although strong states and prosperity, peace and public good provision are thought to be self-reinforcing (Besley and Persson, 2011), the positive effect of state capacity on development is likely to be complementary to sufficient political representation of different groups in society, or more generally to inclusive political institutions (Acemoglu and Robinson, 2012). For instance, unconstrained rulers may try to use a well-functioning state apparatus to predate on their own population in order to cement political power (e.g. the USSR, China under Mao or Nazi Germany). I provide the first systematic investigation of this potential ‘dark side’ of state capacity in the context of the Rwandan genocide².

Rwanda’s rapid economic growth in the second half of the twentieth century is generally attributed to the activist government that promoted the cultivation of cash crops for the international market, assured peace, and built extensive roads and irrigation works (Verwimp, 2013). Yet in 1994 the same state was heavily involved in the organization and execution of the catastrophic Rwandan genocide (Mamdani, 2002; Des Forges, 1999) during which extremist Hutus killed around 800,000 Tutsis and moderate Hutus (Verpoorten, 2005; Prunier, 1995). I therefore hypothesize a positive correlation between local differences in state capacity and the intensity of the genocide. The rest of this paper tests this hypothesis³.

To measure local state capacity I use the idea that a strong state builds up over time by conscious investment (Besley and Persson, 2009a) or endogenous evolution (Tilly, 1992). I document the expansion of the precolonial Nyiginya recording the total time a subnational district was part of the precolonial kingdom, which I term the ‘duration of incorporation’. This duration of incorporation measures the cumulative effect of the centralizing forces in the Nyiginya kingdom and proxies for precolonial state capacity which, in turn, proxies for modern state capacity. This measure builds on a literature that uses historical exposure to

¹These ideas drive the positive association between state capacity and GDP or quality of institutions (Besley and Persson, 2011; Acemoglu, 2005).

²I focus on state capacity as organizational capacity, which is the crucial dimension emphasized by historians of the genocide. This contrasts with measures focusing on the number of state institutions present at a local level (Acemoglu et al., 2014) or measures using tax income to GDP as a measure of capacity (Besley and Persson, 2011).

³In line with the literature on state capacity, an auxiliary hypothesis is that, before and after the genocide, state capacity positively predicts public good provision and income. I test this hypothesis too, albeit in less detail.

political institutions to show that this exposure predicts contemporary levels of institutional quality. For instance, the time of exposure to state institutions predicts modern measures of state strength and quality of political institutions (Bockstette et al., 2002; Depetris-Chauvin, 2013). Similarly, the time of exposure to democratic institutions predicts levels of democracy today (Persson and Tabellini, 2009). More broadly, a variety of traditional African institutions are found to have persisted through the colonial period to affect outcomes today, from conflict (Besley and Reynal-Querol, 2012) to political centralization (Michalopoulos and Papaioannou, 2013) and public good provision (Gennaioli and Rainer, 2007). I show that the duration of incorporation correlates with modern measures of state capacity. I therefore treat this historical measure as a proxy for modern state capacity.

To measure the local intensity of the violence in the genocide I use the fact that, starting in 2001, the Rwandan government initiated a transitional justice program to resolve grievances and judge perpetrators. Central to this policy was a system of over 8000 Gacaca courts, trying alleged perpetrators. I use data from these Gacaca courts to reconstruct a measure of the local intensity of the genocide (Verpoorten, 2011; Yanagizawa-Drott, 2010). My baseline estimates correlate the duration of incorporation with the intensity of the violence in the genocide.

Confirming my main hypothesis, I establish a positive, significant and robust correlation between the duration of incorporation and the intensity of the genocide. This result is illustrated in Figure 1. The horizontal axis measures the Duration of Incorporation in years. A longer duration proxies for higher state capacity. The vertical axis records violence as a percentage of population. The observations are precolonial districts in the Nyiginya kingdom⁴. The figure shows a strong positive relationship between the duration and violence in the genocide⁵.

[insert figure 1 about here]

The main result is robust to controlling for a large set of historical and contemporary covariates as well as to several methods of aggregating the violence data, and to using Conley standard errors to correct for spatial correlation. A selection exercise in the spirit of Altonji et al. (2005) shows that it is highly unlikely that the main result is driven by unobservables. Most importantly however, the main result is robust to including the percentage of Tutsi and the number of Gacaca courts as controls. Since the ruling lineages in Nyiginya kingdom were Tutsi and Tutsi were the main target of the genocide, failure to

⁴The districts, with names, are mapped out in Figure A1 in the online appendix. Figure 2 below maps the duration of incorporation for each district.

⁵Confirming my auxiliary hypothesis, I also show that the duration of incorporation positively predicts public good provision before the genocide as well as prosperity, proxied by satellite density at night, before and after the genocide.

control for the presence of Tutsi leads to a mechanical correlation between state capacity and violence. Similarly, the Gacaca courts data records prosecutions and not actual participation. A greater ability to identify potential perpetrators may be a result of higher state capacity, and increases the number of prosecutions, creating another mechanical correlation. I control for the number of Gacaca courts to mitigate this concern. The bottom panel of Figure 1 shows that including these controls leaves the correlation intact.

Even after controlling for several competing explanations for differences in the intensity of the genocide as well as controlling for the percentage Tutsi and number of Gacaca courts, there may still be selection into a higher duration of incorporation. To mitigate this problem, I present GMM estimation instrumenting the duration of incorporation with 1) an index that measures the geographic suitability for keeping cattle and 2) the distance to the historic center of the precolonial kingdom. Cattle played a pivotal role in the Nyiginya kingdom cattle, both as a store of wealth and as the nexus of a complex system of social institutions revolving around the lending of cattle by a patron in return for services rendered by a client. Since the kingdom expanded (by conquest) in search for cattle, the geographic suitability makes a particular district more attractive for incorporation. Hence, the suitability for cattle creates variation in the timing of the incorporation of a precolonial district⁶. The geographic suitability for keeping cattle is correlated with the historical expansion of the kingdom but can be excluded from a specification linking state capacity to the intensity of violence in the genocide. By 1980 cattle had lost its pivotal position in Rwandan society mainly because most pasture land in Rwandan had been converted to agricultural land. It is therefore unlikely that the suitability for pasture entered individual's decisions of whether to engage in genocide. As an alternative strategy, I use the distance from Gasabo hill, the site of the foundation of the kingdom as an instrument for the duration of incorporation. GMM estimates using a cattle suitability index and/or the distance from Gasabo hill as an instrument for the duration of incorporation confirm the earlier OLS results. Greater local state capacity is associated with greater violence in the genocide. Furthermore, the first stage has the predicted sign. Better suitability for keeping cattle or closer proximity to Gasabo predicts earlier incorporation into the Nyiginya kingdom. I corroborate the excludability of cattle suitability by showing that the results are robust to including several measures of wealth and general agricultural suitability as well as presenting a test of overidentifying restrictions. Using the point estimates from the most demanding GMM regression I show that 150 extra years of state history (going from the 25th to the 75th percentile) gives rise to an eight percentage point increase in genocide violence.

⁶Since the whole kingdom became part of the German colonial possessions at the same time, all variation in the total duration of incorporation comes from the initial year of incorporation.

I next turn to the persistence of historic state capacity. A simple falsification exercise shows that there is no correlation between the duration of incorporation and violence if the violence is not state organized. More specifically, the duration of incorporation does not predict locations of violence in the 1959 coup nor does it predicts violence in post genocide Rwanda. These falsification results justify focusing on the persistence of state capacity as a channel connecting precolonial state capacity and violence intensity in the genocide (and not, for instance, persistent violence). I show results that relate the duration of incorporation to measures of GDP and public goods from the colonial period and the period leading up to the genocide. The falsification and the persistence results show that precolonial state capacity persists. I conclude by briefly discussing heterogeneous effects in state capacity persistence.

1.1 Contributions and related literature

This paper improves our understanding of the effects of state capacity on development outcomes, provides insight into the determinants of violence and extends our understanding of development in Rwanda.

1.1.1 State Capacity and Development

I contribute to a growing literature examines the determinants and the effects of state capacity. The work of Besley and Persson (2009a, 2010, 2011) shows how conflict and investments in state capacity are both determinants and outcomes of (future and past) state capacity. Indeed, in cross-country data, measures of greater state capacity are correlated with higher GDP and lower conflict intensity (Besley and Persson, 2011). More broadly, measures of property rights institutions, which are generally more prevalent in stronger states, correlate positively with GDP (La Porta et al., 1999; Acemoglu et al., 2001). My main result that greater state capacity causally impacted violence in the genocide refines these cross country correlations. Specifically, this result suggests that institutions that are conducive to economic development in most institutional/political equilibria, may exacerbate conflict (or other disruptions to society) in other equilibria. The idea that institutions that foster development have a ‘dark side’ has received limited attention in economics. One notable exception is Satyanath et al. (2013) who show that places in Germany that had higher levels of social capital saw faster growth of Nazi party membership in the years leading up to the second world war. One interpretation of the finding of a ‘dark side’ of state capacity is given by Acemoglu (2005) who models a self-interested ruler who can supply public goods as well as divert resources for his own use. In his model, a state that is too strong taxes too much and creates inefficiencies that stifle economic activity. In contrast, a state that is too weak does not provide public goods. He also shows that, in terms of political institutions, a state that is too strong can entrench itself from its citizens and abuse its power (in the model, the politicians set excessive tax rates). My results suggest that both effects can

be at work in the same polity at different but close points in time. Data on mass killings confirms this suggestion. Over the last two centuries, 71 percent of all mass killings of citizens by their own governments were perpetrated by three strong states, Germany, Russia/USSR and China (Easterly et al., 2006). Over the twentieth century, this percentage rises to around 80 percent (Rummel, 1998)⁷. Germany and China have also witnessed sustained economic growth in recent decades.

Methodologically, I make two contributions. First, I move to a below-ethnicity level of analysis. Previous studies using historical measures of state capacity or political centralization operate at the country level (Bockstette et al., 2002; Depetris-Chauvin, 2013), the level of the historic state (Bockstette et al., 2002; Depetris-Chauvin, 2013), or the ethnicity (Michalopoulos and Papaioannou, 2013). Second, I focus on the expansion of the precolonial Nyiginya kingdom to obtain a proxy for state capacity. This method can be applied to other centralized precolonial polities that expanded by conquering, such as Buganda or the Ashanti empire.

Finally, by showing that within-ethnicity state capacity persists I contribute to a literature concerned with the persistence of historical institutions or culture (Nunn, 2008, 2009; Dell, 2010). I move beyond existing studies by showing that persistence operates at the within ethnicity level as well.

1.1.2 Violence

This paper contributes to the large literature on civil conflict, surveyed in Blattman and Miguel (2010), by showing how a strong state was significantly involved in genocidal violence. Previous theoretical work on the relationship between state capacity and violence (Besley and Persson, 2009b, 2010; Acemoglu et al., 2010) points to a negative relationship; the weaker the state the more violence. This paper shows that this is not necessarily the case. The Rwandan case shows that state capacity can not only be used to wage war on people threatening the state but also to predate on the population. History is littered with examples of the state predated on the population (Acemoglu and Robinson, 2012). This paper shows one way how variation in success of this repression comes about.

By examining the idea that the state was a key actor in the genocide, I also contribute to a growing literature in economics examining specific explanations for the Rwandan genocide. For instance, Yanagizawa-Drott (2010) shows that the Rwandan hate radio predicts differential intensity in genocide

⁷Similarly, compulsory sterilization has been more widespread in countries with a stronger state, from the United States or the United Kingdom in the early twentieth century (Barkan, 1992) to China more recently as part of its one-child policy (Gewirtz, 1994).

violence. Rogall and Guariso (2014) show that in places that provided easier access to youth militias that instigated violence, popular participation in the genocide was higher.

The rest of this paper proceeds as follows. Section 2 gives an overview of the relevant episodes of Rwandan history. It establishes the validity of using the duration of incorporation of as a measure of precolonial state capacity. Section 3 presents the data sources and the descriptive statistics of my dataset. Section 4 presents the estimating equations and OLS and GMM evidence for the baseline specification, the effect of the duration of incorporation on the intensity of violence in the genocide. This section also discusses threats to the identification strategy. Section 5 discusses the robustness of the main results and considers the channels of transmission. Section 6 then moves on to the persistence of state capacity. This section also establishes the result that the duration of incorporation predicts modern public good provision and prosperity. Section 7 concludes.

2 Historical background

In order to establish the validity of my research design, I present historical evidence showing that the Nyiginya kingdom was strong in the sense that there was centralized capacity to implement policy, that this capacity persisted and that the organization of the genocide was such that local differences in state capacity can be linked to differences in genocide intensity. The historical narrative in this section complements the regression evidence on the persistence of historical state capacity in section 6.

The expansion and organization of the Nyiginya kingdom: a strong precolonial state. The precolonial Rwandan kingdom, named the Nyiginya kingdom after the dominant lineage, was founded in the sixteenth century by a king named Ndori (Vansina, 2004, p. 32)⁸. Until about 1700, the extent of the kingdom was confined to a small area in central Rwanda. From 1700 to 1900, Ndori's successors expanded the kingdom to beyond Rwanda's current borders. Put differently, when Rwanda was formally annexed to Germany's colonial possessions in 1897, some parts of the Nyiginya kingdom had been part of a centralized polity for over 200 years whereas other parts had only just been incorporated.

In the Nyiginya kingdom, central power was exercised mainly through a hereditary standing army and the travelling royal court (For a full description of the pre-colonial Rwandan state, see Vansina (2004)). This court employed diviners, cattle herders, army generals, soldiers, as well as servants to enable the entire court to move through the country to (re)assert royal dominance. To ensure loyalty and compliance within

⁸Earlier historiography, most notably the works by Alexis Kagame (Kagame, 1975), put the founding of the Rwandan kingdom in the eleventh century. The online appendix gives the list of kings, following Vansina, used in this paper.

this nascent bureaucracy⁹, the *ubuhake* contract developed (Vansina, 2004, p. 61). The *ubuhake* contracts were ‘entered into’ by a patron and his client. The patron gave one or more head of cattle in usufruct to the client, ensuring his protection in exchange for free labour. This vassalage system enabled the king to requisition the manpower necessary for the army and his court. Throughout the eighteenth and nineteenth century, an expanding court, desire for greater wealth¹⁰, diffusion of *ubuhake* relationships through other parts of society and swelling royal herds generated demand for territorial expansion. Newly acquired land meant new cattle to be distributed under the *ubuhake* contracts, fresh pasture for existing herds and an outlet for excess population. Thanks to its superior army, the Nyiginya kings had the possibility to meet this demand by conquering neighbouring polities (Vansina, 2004, p. 69).

Through conscription, court employment and the ubiquitous *ubuhake* contract, every newly incorporated hill became an integral part of the Nyiginya kingdom. This process forms the justification of the use of the duration of incorporation as a measure of precolonial state capacity. Since annexation of the entire country took 200 years, it is plausible that the earlier a region became a part of the kingdom, the more exposure it had to state institutions. Therefore, regions that were in the precolonial kingdom longer will have built up more state capacity than regions that were in the precolonial kingdom for a shorter period of time¹¹. This assertion is confirmed by econometric results in section 6, but also by anthropological fieldwork. Newbury (1988) shows that reluctance to pay taxes and to submit to control is much more prevalent in areas of Rwanda that were incorporated towards the end of the nineteenth century, such as Ruhengeri, than in the parts of Rwanda that were incorporated earlier.

The persistence of state capacity. Having been a German colony for twenty years, Rwanda passed to the Belgians after World War I. The Belgian colonial government requisitioned labour through local chiefs, who in turn organized this labour using existing *ubuhake* style relations¹². Rwanda gained independence from Belgium in 1962, becoming a Hutu dominated republic. The new Hutu leadership requisitioned labour like the Belgians had, through the local chiefs. These chiefs, like their colonial and pre-colonial predecessors, used the existing patronage structures to organize labour (Hintjens, 1999). Even today, a similar system operates in Rwanda, taking the form of monthly mandatory community service. This system, too, is led

⁹For the late nineteenth century, the Murdock ethnographic atlas for Rwanda records three levels of bureaucracy above the local, village, level. In his definition, this corresponds to a ‘small state’ (Murdock, 1967).

¹⁰Cattle was the main store of wealth in Rwanda. It represented a future income stream through its milk and its mortgaging value through the *ubuhake* contract.

¹¹This measure echoes a broad literature that uses historical exposure to a state, democracy or a broader set of political institutions to predict contemporary differences in democracy and development (Bockstette et al., 2002; Persson and Tabellini, 2009; Depetris-Chauvin, 2013).

¹²The Belgian colonial government replaced local Hutu chiefs with Tutsis. The Nyiginya kingdom had local ‘chiefs of the land’, usually Hutu, ‘chiefs of the people’, usually Tutsi and ‘chiefs of the pasture, always Tutsi. The Belgians merged these functions into one (Mamdani, 2002, p. 90).

by local government representatives (Purdeková, 2011)¹³. The persistence of local systems to requisition labour provides direct evidence for the persistence of local institutions. It is however likely that this is not the only way local state capacity persists. Another may be a cultural rules of thumb that prescribe state compliance, a channel suggested by the anthropological fieldwork mentioned above. Yet other ways of persistence of state capacity are surveyed in Michalopoulos and Papaioannou (2013). I provide evidence on persistence and differences in persistence in section 6.

The local organization of the 1994 genocide. Following the 1959 revolution that overthrew the Tutsi king, many Tutsi fled to Uganda. In 1987 they formed the Rwanda Patriotic Front and in 1990 they invaded Rwanda. In response, radical Hutus started arming the population¹⁴, forming civilian defence forces and youth militias, the *Interahamwe* and *Impuzamugambi*. Radical Hutus also started a propaganda offensive (Yanagizawa-Drott, 2010), arousing fear for Tutsi retaliation for the 1959 coup (Mamdani, 2002, p. 190). When peace talks between the RPF and the Hutu government in Arusha seemed to end in a shared power agreement, radical Hutus felt their power threatened and jumpstarted the genocide (Verwimp, 2013; Bates, 2008). Estimates vary, but around 800,000 Tutsis and moderate Hutu are said to have perished¹⁵ (Verpoorten, 2005; Prunier, 1995). The genocide ended when the RPF conquered the capital, Kigali.

Scholars agree that the genocide was centrally planned, but execution was largely local (Des Forges, 1999; Mamdani, 2002)¹⁶. For instance, a journalist recalls a meeting in 1991 in which it was decided that a death squad needed to be formed to kill some 300 Tutsi. Although the meeting was presided over by president Habyarimana, the execution was left to the burgomasters¹⁷, who were instructed to find ‘trustworthy people’ to do the job (Verwimp, 2013, p.131). After these initial massacres, elaborate training programs were set up in each commune to train the youth to fight with ‘traditional weapons’, i.e. machetes. One person in ten would be trained while living at home, under the pretense of self defence. Coordination

¹³President Habyarimana argued in 1973 that a forced labour system had always been part of Rwandan culture and tradition (Verwimp, 2013, p. 39).

¹⁴Between 1989 and 1992 military spending increased from 1.9 to 7.8 percent of GDP (Mamdani, 2002, p. 148).

¹⁵The genocide was organized largely, though not strictly, along ethnic lines (many moderate Hutus were also killed). The ethnic division between Hutus and Tutsi was not, however, a racial or genetic division. The online appendix discusses traces these ethnic categories over time and provides the relevant background to the discussion in this paper.

¹⁶There is abundant evidence that the Rwandan state had sufficient local capacity to execute the genocide. The following examples are from Verwimp (2013), unless otherwise cited. For instance, the state could specifically target individuals in the population through its records of births and deaths as well as a racial identity card system. The information for this system was generated through a full parallel organization of party and state at every level of government (see also Purdeková (2011) for a description of this organization). The state also mobilized the entire population into *umuganda* forced labour sessions, as well as frequent animation ceremonies to honour the president. At a higher level, the state drew up and executed detailed five year plans for agricultural production, which involved forced resettlement schemes and forced cultivation of export crops. These plans were locally monitored by so-called agricultural monitors who kept track of production (1 for every 120 people where export crops were grown, 1 for every 750 everywhere else). Furthermore, public decency was enforced, with the police closing bars at twelve o'clock at night.

¹⁷The burgomasters were the government representatives at the *commune* level. Footnote added by Leander Heldring.

of these activities was left to sector councillors and the local police (Ibid. p. 147). In early 1994, just before the genocide, the government ordered the local governments to supply a list of potential reliable people and reservists. A day later, a list of useful people was handed out to every sector, detailing those who would be eager to join the genocide. At the same time, the sectors were responsible for identifying the targets for the genocide as well as computing the required number of machetes and firearms (Ibid. p. 148). For a full description of the use of decentralization by the Rwandan government before the genocide, see Des Forges (1999).

When the genocide started, the military and youth militias directed the killings that were carried out by the ordinary Rwandans, who were requisitioned like in colonial times (Des Forges, 1999, p.8 and passim). In fact, in line with the long tradition of compulsory labour for the state, some ringleaders in the genocide referred to the killings as a duty, a *corve*, that was to be performed for the state. One eye-witness reported that a certain chief organized a band of Hutus to bring their machetes to clear a plot of forest, only to send them to kill Tutsis instead (Mamdani, 2002, p. 194). Killing men came to be known as ‘bush clearing’ and killing women and children was known as ‘pulling out the roots of the bad weeds’.

2.1 Summary

The preceding paragraphs have provided historical evidence for key elements in my research design. First, the slow expansion and centralized power of the Nyiginya power generate variation in the exposure to state institutions. I capture this variation in the duration of incorporation measure of state capacity. Second, local institutions persisted in Rwanda, linking the pre-colonial state to modern variation in state capacity. Third, the genocide was, at least partially, locally executed. This provides the final link in the design: local differences in state capacity can arguably be linked to local differences in intensity in the genocide. These arguments taken together positively link local differences in state capacity in the Nyiginya kingdom to local differences in the intensity of the genocide, as hypothesized in the introduction. The following paragraphs test this hypothesis in a regression framework.

3 Data and Descriptive statistics

The unit of observation in this paper is the modern administrative sector, of which there are 416. Due to a change in administrative boundaries in 1996 the number of sectors in the sample is reduced to 383. Dropping an extreme outlier further reduces the sample to 382 sectors, which form the sample in all OLS regressions. For a detailed discussion of administrative boundary changes in the period under study, see the online appendix.

3.1 Data

Violence. My main dependent variables are two measures of violence in the 1994 genocide. The data are taken from the National Service of Gacaca Jurisdictions court proceedings. A Gacaca court meeting is a form of traditional local justice, revolving around a village meeting in which the accused confess or deny crimes and are sentenced or acquitted. Starting in 2001, over 8000 of these courts were instituted in Rwanda to reduce the enormous backlog in the regular court procedures (For a detailed description of the data as well as the Gacaca procedure, see (Verpoorten, 2011)). The website of the Gacaca system (<http://www.inkiko-gacaca.gov.rw/En/EnLaw.htm>, no longer operational on March 1st, 2013) has published lists of the number of people prosecuted per administrative sector, in three categories of crimes:

1. Planners, organizers and supervisors of the genocide. This includes organizers at the local bureaucratic level and within political parties as well as the youth militias
2. Murder, manslaughter, and non-lethal violence with the intention of killing
3. Violence against property, if not amicably settled

In my sample there are, divided over 382 sectors, 666476 prosecuted people, 62935 in category 1, 354808 in category 2 and 248733 in category 3. Throughout the analysis I use two measures of violence in the genocide. First, the sum of the three categories, normalized by the population in the relevant commune in 1991, which I will call ‘violence’ throughout this paper¹⁸. Second, I use the number of prosecuted people in category 2, again normalized by the 1991 population. I call this measure ‘murder’. The Gacaca categories allow for many more measures of violence, such as the absolute number of prosecuted people, or a principal component approach (Verpoorten, 2011). The online appendix outlines the procedure of merging the Gacaca data to the modern sector level and describes the robustness of the results to different measures of violence.

The Duration of Incorporation. The main explanatory variable, the duration of incorporation, is computed by subtracting the year of incorporation of sector i into the Nyiginya kingdom from 1897, the year in which Germany formally annexed Rwanda as a colony. The year of incorporation varies at the level of the precolonial district within the Nyiginya kingdom. Finding this year for each district follows two steps. First, from the reconstruction of the history of the Nyiginya kingdom in Vansina (2004) it is possible to infer a list of subdivisions of the kingdom and in which year of the reign of which king each district was incorporated. Combining this list with a list of dates of the reign of each individual king produces the data for the year of incorporation. Second, to assign a year of incorporation of a precolonial district to a modern

¹⁸The data for the 1991 census is available at the commune level, one level above the sector. See the online appendix for a detailed discussion of administrative units.

sector, I combined maps from Belgian colonial sources (Paternostre de La Mairie, 1972; Belgium, 1952) and maps of the Nyiginya kingdom in Vansina (2004) into a GIS map of precolonial Rwanda. Merging this map with a digital map of modern sectors completes the process, which is visualized in Figure 2. The middle map shows the precolonial districts and the color indicates the range of years in which the year of incorporation falls. The top map displays the intensity of violence in the genocide (discussed above). The online appendix traces every step of the matching procedure in greater detail, and for every precolonial district individually. The online appendix also shows that the main result in the paper is not sensitive to using different coding mechanisms for the data in Vansina (2004).

[insert figure 2 about here]

Instruments: the cattle suitability index and the distance to Gasabo hill. The main instrument in this paper is a cattle suitability index, composed of three ‘factors’: suitability for pasture land, terrain slope and suitability for Savannah TseTse. The index captures exogenous, geographic, factors that influence the suitability for cattle keeping of a certain part of the country. I argue that this index introduces variation in the attractiveness of a district for conquest and, hence, in the duration of incorporation.

Section 2 illustrated the importance of cattle in the Nyiginya kingdom, in its function as a store of wealth as well as the basis of the *ubuhake* contracts. When expanding, the Nyiginya kings therefore chose places that were more suitable for keeping cattle. The “primary goal [of expansion] was to raid cattle” (Vansina, 2004, p. 50). Ndori and the later kings were “looking primarily for herds” (Ibid.) and “their preferred victims were herders” (Ibid.). It is therefore plausible that expansion was more successful in areas that are more suitable for cattle. Indeed, Vansina (2004, p. 47) notes: “Thus the cow as much as the bow and the spear founded the Nyiginya kingdom”. These observations form the basis for using the cattle suitability as an instrument for precolonial state capacity. Section 4 discusses the exclusion restriction imposed by using the cattle suitability index. The core of the narrative for why the exclusion restriction holds is that, under mounting population pressure over the twentieth, Rwandans (aided by government policy) substituted away from cattle towards agriculture, which yielded higher returns per acre. This resulted in a situation in which cattle suitability played no role in an individual’s decision to participate in the genocide. This narrative is supported below by J-tests for overidentifying restrictions and controls for several potentially confounding factors, such as general agricultural suitability and wealth.

The link of each factor of the index to cattle suitability is intuitive. TseTse is a major factor in the suitability for cattle to survive in Africa (Maudlin, 2006). and is known to be a factor in Rwanda especially in

the North-Eastern part of the country (Vansina, 2004, p. 15). Furthermore, the effect of TseTse on modern development works primarily through precolonial political institutions (Alsan, 2012). The suitability for pasture is important for several reasons. First and foremost, if a district is more suitable for cattle, it is a more valuable place to conquer. Furthermore, the swelling royal herds needed ever more pasture land. Finally, population growth within the Nyiginya kingdom increased demand for pasture land. Ganskopp et al. (2007) argue that livestock generally does not graze on slopes above ten degrees. In my dataset slope varies between zero and fifteen degrees, so I include this variable in the index.

The cattle suitability index I use throughout this paper is the product of the the suitability for pasture land, terrain slope and the suitability for Savannah TseTse¹⁹. The online appendix shows that this particular functional form is not essential, summing the factors, taking a weighted average or defining cutoffs for the components and creating a dummy instrument does not change the results. The main reason for using an index instead of just one factor is Rwanda's varying geography and the implications this has for the power of the first stage. The duration of incorporation takes values between 0 and 197. Each geographical measure by itself is not finegrained enough to discriminate between values to such an extent that the power of the first stage is high enough. This lack of granularity in each individual measure is due to the Rwanda's varying geography. TseTse is only important in the low lying Eastern region of Rwandan (Vansina, 2004, p. 15). Slope is not important here, but does matter in the West, where the Albertine Rift mountain range cuts through the country from North to South. Pasture suitability allows me to differentiate between precolonial districts in the hilly central part of Rwanda, where there is no TseTse and relatively little slope variation. When combined, the index of these factors is powerful enough to generate an informative first stage. Each factor, however, does correlate with the duration of incorporation as expected. More importantly, as shown in the online appendix, controlling linearly for the elements of the index does not weaken the first stage. Figure 2 gives a map of Rwanda with the values for the cattle suitability plotted at the sector level. Note that the cattle suitability index also predicts the year of incorporation, and hence the total duration of occupation, outside of the central part of Rwanda. This shows that the cattle suitability index does not just capture the effect of being in the central part of Rwanda versus being in the peripheral part.

An alternative strategy is to directly exploit the spatial expansion of the kingdom. The Nyiginya kingdom is said to have expanded from Gasabo hill, a hill North West of Kigali. I therefore instrument

¹⁹Rwanda is unsuitable for other TseTse subspecies, such as the forest TseTse. The online appendix fully describes the construction of the index.

for the duration of incorporation with the distance to Gasabo hill. The main threat to the exclusion restriction for this instrument is that Gasabo hill is close to Kigali (23 kilometers apart). I therefore include the distance to Kigali as a control. The existence of this alternative instruments allows testing overidentifying restrictions, which I do in section 4.

3.2 Descriptive Statistics

Table 1 contains the descriptive statistics for the violence and murder variables, the duration of incorporation, the main controls in the regressions presented in the next section as well as the components of the cattle suitability index. The first two columns contain the mean and the standard deviation of these variables. The next four columns contain the mean and standard deviation for subsamples containing observations that are below and above the median of the duration of incorporation. The last columns contain a t-test of the difference of means of the variables in the subsamples.

[insert table 1 about here]

The main variables of interest, violence and murder, have significantly different means in the two subsamples. The mean of violence increases from 7.08 to 11.53 and this difference is significant at the 1% level (t-stat: -5.49). Furthermore, the difference has the anticipated sign, a higher duration of occupation is associated with higher violence. The mean of murder increases from 4.01 to 5.99 across subsamples, again a statistically significant difference. These patterns indicate positive support for the hypothesis that local differences in state capacity in Rwanda are associated with higher violence in the genocide. The next sections explore this pattern in more detail.

4 Estimating Equations and Results

OLS estimations. The first set of estimates considers a linear relationship between the duration of incorporation and violence/murder, estimated using OLS. The baseline estimating equation is:

$$Y_{id} = \beta_0 + \beta_1 Duration_{id} + \mathbf{z}'_{id}\beta_2 + \mathbf{q}'_{id}\beta_3 + \mathbf{r}_d + \varepsilon_{id} \quad (1)$$

Y_{id} is violence or murder in sector i in modern district d . $Duration_{id}$ is the duration of incorporation defined as $(1897 - x_{id})$ where x_{id} is the year of incorporation in the Nyiginya kingdom for sector i in modern district d , making $(1897 - x_{id})$ the natural measure of duration of incorporation. β_1 is the coefficient of interest, the measured relationship between the duration of incorporation and violence in the genocide. \mathbf{r}_d is a vector of modern district level fixed effects. These fixed effects account for unobserved heterogeneity at the level of the modern administrative district. ε_{id} is the error term. \mathbf{z}_{id} is a vector of the two most

important confounding variables in my analysis, the number of gacaca courts in a particular sector as well as the percentage Tutsi from the 1991 census in the commune containing the sectors. I will discuss these variables as they are introduced. \mathbf{q}_{id} is a vector of geographical and distance covariates. In most estimations, this vector includes the distance to Kigali, the Rwandan capital, the distance to the border, distance to the nearest river, the nearest major road, terrain elevation and terrain slope.

The assumption of linearity of estimating equation (1) is justified. Figure A2 in the online appendix provides non-parametric LOWESS estimates of the relationship between the duration of incorporation and violence as well as between the predicted values of the duration of incorporation from the first stage (see below) on violence. Both estimates point to a linear model as the best approximation the relationships in the data. For the predicted values relationship, a formal Box-Cox test fails to reject a linear model (p-value: 0.174).

GMM estimations. The first stage of the system of estimating equations using the duration of incorporation or the distance to Gasabo as instruments is:

$$Duration_{id} = \gamma_0 + \mathbf{s}'_{id}\gamma_1 + \mathbf{z}'_{id}\gamma_2 + \mathbf{q}'_{id}\gamma_3 + \nu_{id} \quad (2)$$

Where $Duration_{id}$ is the duration of incorporation of sector i in district d and \mathbf{s}_{id} is a vector containing the instruments, the cattle suitability index and the distance to Gasabo and ν_{id} is an error term. The second stage equation is:

$$Violence_{id} = \beta_0 + \beta_1 Duration_{id} + \mathbf{z}'_{id}\beta_2 + \mathbf{q}'_{id}\beta_3 + \varepsilon_{id} \quad (3)$$

This system is estimated using a linear just-identified GMM estimator.

4.1 State Capacity and the Rwandan Genocide: OLS and GMM estimates

Ordinary Least Squares results. Table 2 reports the results from estimating (1) using OLS. Column (1) has results for the simplest specification, without controls, for violence. Moving through the columns adds more controls. Columns (4) through (8) report the same specifications using murder as the dependent variable.

[insert table 2 about here]

Column (2) and (6) introduce a set of geographical controls and fixed effects at the modern district level²⁰. The geographic controls capture several features that potentially confound the relationship between

²⁰Adding fixed effects at the commune level (there are 145 communes) leaves too little variation within each commune in the duration of incorporation (There are 49 precolonial districts). Post 2002 districts are the lowest level available above the commune. There are 31 modern districts.

state capacity and violence/murder. The distance to Kigali captures the spread of the genocide from the capital and the fact that the youth militias were sent out from the capital to break deadlock situations or jumpstart the killings (Rogall and Guariso, 2014). The distance to the country border, the distance to the nearest river, the distance to the nearest major road, terrain elevation and terrain slope all capture remoteness or ease of access to a particular sector. Column (3) and (4) (and (7) and (8)) introduce two important confounding factors, the percentage Tutsi living commune c as well as the number of Gacaca courts in sector s . Although the percentage Tutsi can be viewed as an outcome of state capacity through, for instance, forced resettlement controlling for it precludes the possibility of a mechanical correlation through the higher availability of Tutsi targets in the genocide. Similarly, the number of Gacaca courts is intended to capture that higher state capacity, aside from influencing violence intensity, arguably also influences the success of prosecutions in the Gacaca courts, producing a mechanical correlation between duration of incorporation. In Table 2, curly brackets report Conley (1999) standard errors that allow for arbitrary (two dimensional) spatial correlation. Parentheses report one-way clustering at the precolonial district level. Squarebrackets report two-way clustered standard errors (Cameron et al., 2011), clustered at the commune and the precolonial district level. Computing these standard errors corrects for cross sectional dependence at the level of the primary sampling unit of the duration of incorporation, the precolonial district, as well as at the level at which some controls vary, the commune. In all specifications, Conley errors are lower than the one-way or two-way clustered standard errors which are very similar. For the remainder of this paper, I report one-way clustered standard errors.

In all specifications, the effect of the duration of incorporation on violence or murder is positive and statistically significant, supporting my hypothesis that state capacity was a key instrument in carrying out the genocide. Controlling for geographical covariates as well as for the percentage Tutsi and the number of Gacaca courts lowers the point estimate, as expected, but the main results stands. Not only are the coefficients positive and statistically significant they are economically meaningful as well. To see this, note that the interquartile range of the duration of incorporation is 147 year. Using the most demanding specification for violence in column (4) this means that moving through the interquartile range increases violence by 4.41 percent or about half its mean²¹. For murder, moving through the interquartile range increases murder by about 2.5 percent, again about half its mean.

²¹Modern state capacity is only imperfectly proxied for by the historical state capacity, which is itself proxied for by the duration of incorporation. This estimate is therefore likely to be a lower bound estimate of the effect of state capacity on the intensity of violence in the genocide.

GMM results. The positive correlation between the duration of incorporation and violence in the genocide reported in Table (2) supports the hypothesis that local differences in state capacity predict differences in the intensity of the 1994 Rwandan genocide. However, districts that were incorporated earlier may differ systematically from districts that were incorporated later in a way that correlates with the intensity of the genocide. This section implements an instrumental variable strategy to show that the main result is not due to this kind of selection.

[insert table 3 about here]

Table 3 reports the results from estimating the system of equations (2) and (3) using GMM. Using a linear just-identified GMM estimator gives results that are, in this context, identical to using a 2sls approach but makes Conley (1999) standard errors easily implementable. The top panel reports the second stage estimates and the bottom panel reports the corresponding first stages. The first stage estimates show that the cattle suitability index is positively correlated with the duration of incorporation. This is consistent with the narrative in section 2, which highlighted the fact that cattle suitability influences the desirability of a district for incorporation. Anderson-Rubin confidence intervals reported for the second stage as well as the first stage Angrist-Pischke F-stat²² indicate that estimations using the cattle suitability index do not suffer from weak instrument issues. The second stage estimates report positive and significant effect of the duration of incorporation on both measures of the intensity of the genocide, violence and murder. Column (1) reports the estimates without any additional controls, column (2) adds a set of geographical controls. Column (3) adds the percentage of Tutsi and the number of Gacaca courts and column (4) controls for everything. Columns (5) through (8) contain the same estimates for murder.

Table 3 reports a positive significant effect of the duration of incorporation on violence and murder²³. This is consistent with the hypothesis of this paper as well as with the OLS results in Table 2. However, the IV results are only interpretable as causal if there is no direct channel from cattle suitability to the intensity of the genocide.

The exclusion restriction. The main threat to identification is that the cattle suitability index has a direct effect on violence in the genocide. This would be the case if, for instance, areas that were most suitable for cattle are richer in soil and therefore perpetrators of the genocide expected richer people to live there, making these areas attractive targets in the genocide. By the time of the genocide, however, cattle had lost its prominent position in Rwandan society. There are several reasons for the (relative) loss of

²²The Angrist-Pischke F-stat is the F-stat of the first stage after having partialled out all exogenous variables that are instrumenting themselves.

²³As in Table 2, the results are quantitatively meaningful. Moving through the interquartile range increases both violence and murder by their respective means.

importance of cattle and cattle herding by the time of the genocide. Most importantly, post-independence agricultural policy was aimed at relieving population pressure by extending the land under cultivation²⁴ at the expense of cattle herding (Verwimp, 2013, p. 39). This had as a consequence that the land frontier was reached by 1990 (Ibid., p. 122). Another consequence was that in 1986 only 16 percent of land in Rwanda was used for pasture versus 66 percent for agriculture (Ibid. p. 61) and that a typical household in 1990 derived only 5,5 percent of its income/consumption from livestock-related products versus nearly sixty percent from subsistence consumption of crops (Ibid. p. 63). This percentage is likely to have been even lower for richer individuals who were more likely to be targeted in the genocide. The agricultural sector as a whole had shrunk as well before the genocide. After the collapse of the coffee sector, agriculture accounted for only 48 percent of Rwandan GDP in 1986 (Mamdani, 2002, p. 145). Finally, the institutions that inflated the value of cattle, such as the *ubuhake* contract, the role of cattle as a prestige good and as a store of wealth were abolished over the course of the second half of the twentieth century.

[insert table 4 about here]

These reasons make it unlikely that the geographical suitability for keeping cattle had a direct impact on the intensity of the genocide. However, even if cattle suitability did not have a direct impact at the time of the genocide, it may proxy for factors that do have a direct impact, such as general agricultural suitability and wealth. Table 4 investigates the exclusion restriction in a regression framework, assessing the effect of factors that may be proxied by cattle suitability. For instance, places that are more suitable for cattle may also be more suitable for agriculture or perhaps they are just richer. Columns (1) through (3) and (6) through (8) of Table 4 add several proxies of historic wealth to the regression of violence/murder on the duration of incorporation. For instance, column (2) and (7) add mean satellite light density at night for 1992 as a proxy for wealth levels before the genocide. Columns (3) and (8) add the Number of 500 head of cattle in 1960, as a proxy for colonial wealth. The effect of duration of incorporation remains strong and significant. Columns (4) and (9) add four measures of suitability for the main staple crops in Rwanda, Banana and Sorghum as well as the two main export crops, Tea and Coffee. Columns (5) and (10) add all the new controls together. Controlling for these potential channels through which cattle suitability may indirectly affect the intensity of the genocide does not weaken the result.

Overidentifying restrictions. The availability of the distance to Gasabo hill as an additional instrument allows me to probe the exclusion restriction further. Table 5 has results for this exercise. Columns (1) and (2) just use the distance to Gasabo as an instrument, varying the dependent variable. Starting in

²⁴In a celebratory government publication in 1987, looking back on the 1959 coup, it was argued that it was a peasant revolution in which “the predominance of the cow was replaced with the predominance of the hoe” (Verwimp, 2013, p. 50).

column (3) I use both the distance to Gasabo and the cattle suitability index as instruments. The positive significant effect of the duration of incorporation on violence and murder is unchanged. In fact, the p-values of the coefficients of the duration of incorporation in the most demanding specifications in columns (6) and (10) are lower.

[insert table 5 about here]

More importantly, having two informative instruments allows a direct test of the exclusion restriction. Starting in column (3) I report the p-value of the Hansen overidentification test. This test assumes that one instrument is exogenous and tests the exogeneity of the other. A low p-value is evidence that the null hypothesis of exogeneity is violated. In practice, this means that I will observe a low p-value if either the distance to Gasabo or the cattle suitability index has a direct effect on violence or murder. The tests of the overidentifying restrictions support the validity of the cattle suitability index as an instrument, pointing to the validity of a causal interpretation of the observed relationship between the duration of incorporation and the intensity of the genocide. The low p-values in columns (3) and (6) are a consequence of the omission of the distance to Kigali, which is close to Gasabo hill, as a control. Including the distance to Kigali produces p-values that are in line with the other columns (results not reported).

5 Channels of transmission and robustness

This section investigates the robustness of the main results to alternative hypotheses about the intensity of the Rwandan genocide. Although I have shown that the effect of the duration of incorporation on the intensity of the genocide can be interpreted as causal and is quantitatively meaningful, state capacity is clearly not the only factor that determines the intensity of the genocide. Before reviewing the main hypotheses from the literature I assess the extent to which my OLS estimates can be weakened by (potentially unobservable) covariates. I follow the strategy pioneered by Altonji et al. (2005) and Bellows and Miguel (2009) which uses the extent to which including controls weakens a results to infer how much unobservables would have to weaken the result to explain it away.

More specifically, I use the ratio $\frac{\hat{\beta}_{extended}}{\hat{\beta}_{baseline} - \hat{\beta}_{extended}}$ where $\hat{\beta}_{extended}$ is the coefficient on the variable of interest in a regression that includes controls and $\hat{\beta}_{baseline}$ is the coefficient on the same variable of interest in a regression that uses little or no controls. This ratio then captures the bias unobservables would need to introduce to make the result go away, based on the extent to which observable controls make the result weaker. If the coefficient drops substantially when including more controls this ratio will be low and I would expect the result to be sensitive to the inclusion of unobservables. If the coefficient is stable this gives a

high ratio and indicates that the estimates are not artificially high due to the omission of unobservables.

[insert table 6 about here]

Table 6 reports results from this exercise. Column (1) report the ratio for a regression with violence as the dependent variable and column (2) reports results for murder. The columns labelled Baseline controls and Extended controls give the sets of controls used in the regressions that give the relevant $\hat{\beta}_{baseline}$ and $\hat{\beta}_{extended}$. I consider two baseline sets of controls and two extended sets of controls. The first baseline set is empty, the second contains the percentage Tutsi and the Nr. of Gacaca courts, the main controls from table 2. There are three extended sets. The ‘Geographic controls’ includes elevation, slope, distance to the nearest river, nearest road, Kigali, the border and the suitability for wheat, coffee, tea, sorghum and bananas. The ‘Historic controls’ include missionary presence in 1924 and 1935, the number of hospitals in 1935 and in 1960, the number of 500 head of cattle in 1960 and the number of coffee pulping centers in 1960. The ‘Modern controls’ include include, from the 1991 census, the percentage Tutsi, the percentage of illiterate people, the percentage of people with primary or higher education, the percentage of people in prison, the percentage Burundi, the percentage of people owning a radio, population density and the number of secondary schools in 1980. Using these sets of controls produces twelve ratios, each giving the extent to which the coefficient is reduced between regressions using baseline controls and extended controls.

All positive ratios are well above one, the lowest is 5.57 and the median is 13.12. This means that the OLS estimate of the duration of incorporation on violence in the genocide can be attributed to selection on unobservables only if this selection effect is at least 5.57 times as strong as the effect of observables. Some ratios are negative, indicating that the point estimate of the coefficient on the duration of incorporation goes up when including more controls. The ratios reported in Table 6 therefore indicate that the main result in this paper is not driven by unobservables.

5.1 Alternative Explanations

This sections reviews several measures of alternative explanations of local variation in the intensity of the genocide, surveyed in Mamdani (2002), Des Forges (1999) and Hintjens (1999). I interpret including these controls as both assessing the robustness of the result to their inclusion as well as being informative about the channel of transmission between duration of incorporation and violence/murder. That is, if the coefficient on duration of incorporation is substantially lowered by inclusion of a particular control, then this control can be viewed as a channel of transmission from duration of incorporation to the intensity of the genocide.

One of the main hypotheses explaining local variation in genocide intensity is advanced by André and Platteau (1998). They argue that high population density created Malthusian pressures and the killings were a way to restore the Malthusian ‘equilibrium’. I use population density from the 1991 census to assess this hypothesis. Another hypothesis concerns the coffee sector. The Belgians created the coffee industry in Rwanda and for a long time this was a major export sector, accounting for 75% of Rwanda’s exports (Des Forges, 1999, p. 46). Just before the genocide the sector all but disappeared. Production fell sharply in response to a large price drop on the international market and interest rate measures imposed by the World Bank worsened Rwanda’s terms of trade. The industry collapsed impoverishing many people in the coffee growing area. I expect these areas to be more heavily involved in the genocide since they had a surplus of young people (Mamdani, 2002, p. 148 and p. 204). Furthermore, Habyarimana’s power was weakened considerably by the collapse of the coffee industry because he used its proceeds to sustain his patronage network. When these proceeds ran out, he had to resort to repression (Verwimp, 2013, p. 80). I include the number of coffee pulping centers in 1960 as a measure of the distribution of this industry before it collapsed. Following Yanagizawa-Drott (2010), column (6) adds the percentage of people that own a radio. He shows that the ‘hate radio’²⁵ was instrumental in the genocide and in fact explains a large part of the violence.

These hypotheses can also be interpreted as explanations for why the genocide happened, and not just explanations for differential intensity of the killings. There are also factors which vary just within Rwanda and, arguably, influence differential intensity in killings. I include the number of schools in 1960 and the percentage of people that were literate from the 1991 census. Mamdani (2002, p. 7) and Des Forges (1999, p. 10) show that schools were often used as places to drive Tutsi together and then kill all of them at once. Furthermore, even throughout the Hutu-dominated period from 1963-1994 Tutsi received more education than Hutus (Mamdani, 2002, p. 89). This would suggest greater violence intensity in districts with more schools. Literacy is expected to correlate with the intensity of the genocide through multiple channels. Literate people tend to be better educated and tend to earn more. This made them a target in the genocide. Furthermore, Mamdani (2002, p. 199) argues that more literate youth were less likely to obey the orders given or be a member of a *interahamwe* militia. I also include the percentage of people self-reporting in the 1991 census to be employed in the military and the percentage of people self-reporting to be from Burundi, are motivated by qualitative evidence that suggests that these groups were disproportionately represented among the perpetrators of the genocide (Mamdani, 2002, p.205).

²⁵The RTL, ‘radio television libres des milles collines’.

Table 7 reports results of estimating equation (1) with modern district fixed effects and, separately and jointly, these controls. I have reported the results for violence²⁶. The estimated coefficient on the duration of incorporation remains significant and stable.

[insert table 7 about here]

5.2 Historical controls

I also control for factors that may influence the relationship between duration of incorporation and the intensity of the genocide through Rwanda’s colonial history (for the importance of Rwanda’s colonial history, see Des Forges (1999), Prunier (1995) and Mamdani (2002)). From maps in colonial records²⁷ I reconstructed the number of head of cattle per sector in 1960 as a measure of colonial wealth, the number of hospitals (including dispensaries) in 1935, as a measure of colonial public health and public good provisions, and the number of missionary stations (any denomination) in 1935, controlling for the influence of missionary activity on development (Nunn, 2010) . I also include the number of missionary stations in 1924 (Ibid.).

I also control for explicitly for the set of geographical variables used in tables 2 through 5, TseTse suitability, elevation, slope, pasture suitability and distance to the border, the nearest river, the nearest town and the nearest road. The results for both the historical controls as well as the geographic controls are reported in web appendix 2. Throughout, the estimated coefficient on the duration of incorporation remains significant and stable.

5.3 Other robustness issues

Spatial correlation and the timing of the genocide. The maps in Figure 2 suggests that there is spatial correlation in both the violence data as well as the state capacity data. I have accounted for spatial effects by clustering standard errors and using Conley (1999) standard errors. Figure 5 visualizes the spatial dimension of the genocide in a different way. The genodynamics project²⁸ has aggregated several news sources reporting on killings in the genocide. For each source, they record the date of the violence reported as well as the prefecture where the violence took place. This allows me to track the spread of the genocide from Kigali to the rest of the country. Unfortunately, the data are only available at the prefecture level, which is the highest level of administration in Rwanda. Each datapoint in figure 5 corresponds to one prefecture and the reported t-stats are the t-stat of the coefficient in a regression of the distance to Kigali

²⁶The results for murder are in the online appendix. This appendix also contains both tables with the duration of incorporation omitted.

²⁷see the online appendix for the sources for all variables mentioned in this section

²⁸Data available at www.genodynamics.com

on the relevant date²⁹. The top row contains two figures; the left figure relates the date of the first mention of genocidal violence to the distance from Kigali and the right figure relates the date at which 50 percent of the total fatalities reported had been reached to the distance from Kigali. The figures show a weak relation, if any, between the distance from Kigali and the spread of the genocide.

[insert figure 5 about here]

The bottom row shows partial residual plots of the duration of incorporation and the same dates, having partialled out the distance to Kigali. The figures shows that the duration of incorporation is positively related to the onset of the genocide, and positively to the speed of the violence, albeit weaker. Subject to the caveat of the high level of aggregation of the data, these figures provide evidence that state capacity was more important for the start of the genocide than the proximity to Kigali.

5.3.1 Measurement and construction of the dataset

Measurement of the dependent variable. My main measures of intensity of the violence in the genocide, violence and murder, are the normalized sums of the number of prosecutions in different categories of prosecutions. Category 1 contains ringleaders and political leaders involved in organizing the genocide and categories 2 and 3 are comprised of individuals harming/killing other individuals or property. Table A2 in the online appendix shows that using different ways of measuring genocide intensity from the categories does not affect the main results. Each category separately, the sum of prosecutions, as well as a principal component approach leaves the main results unchanged.

Coding of the year of incorporation. My main independent variable, the duration of incorporation is computed by subtracting the year of incorporation of precolonial district d from the 1897. The online appendix contains the full data for each district necessary to construct the duration of incorporation measure. These data are mainly coded from Vansina (2004). I have coded most of the years of incorporation directly from his historical narrative. However, it is also possible to infer these dates from maps of ‘snapshots’ of the expansion of the kingdom in Vansina (2004). Table A2-4 in the web appendix gives results for this different measure of duration of incorporation, an ‘incorporated by year t ’ measure. The ‘incorporated by year t ’ measure of the expansion of the kingdom codes a certain district as incorporated only if it appears as part of the kingdom on a map that gives a cross section of the kingdom at year t and not on an earlier cross-section. The results remain the same, but the standard errors are slightly larger reflecting the extra measurement error introduced by the lumping of years of incorporation into the cross-sections.

²⁹In the bottom panels the t-stat is the t-stat on the coefficient for the duration of incorporation controlling for the distance to Kigali.

Underreporting of Tutsi in the 1991 census. Studying Gikongoro province, Verpoorten (2005) suggests that multiplying the reported number of Tutsi by 1.4 should eliminate any underreporting by Tutsis of their ethnicity. It is beyond the scope of this paper to assess any systematic variation in underreporting of Tutsi in 1991 in Rwanda. Higher local state capacity would arguably lead to a more precise identification of ethnicity, leading to less underreporting. Therefore, any bias resulting from underreporting will bias the estimates downward.

6 State capacity persistence

I have argued throughout this paper that the duration of incorporation can be seen as a proxy for state capacity on the eve of the genocide. This section formally investigates this claim and traces the effect of the duration of incorporation through time. Theoretically, there may be multiple channels that can connect historic state capacity to modern state capacity. For instance, if regions that were incorporated into the kingdom later were the ones that put up more violent resistance, the persistence of state capacity may in fact be driven by persistent violence. To focus the analysis on the issue of the persistence of local state capacity as the primary channel, this section first presents a falsification exercise to this effect.

6.1 Focusing on persistent state capacity

Suppose that persistent state capacity is indeed the channel connecting the duration of incorporation to modern state capacity and the genocide. Under this condition, I expect no correlation between duration of incorporation and intensity of violence in other episodes of violence, provided they are *not* state organized. If, however, there is another channel connecting the duration of incorporation to violence, I would expect this channel to be at work in other episodes of violence as well. This reasoning allows a falsification exercise, replacing intensity of violence in the genocide with intensity of violence before and after the genocide. To carry out this falsification exercise, I replace the dependent variable with either a dummy which gets a one if sector i had ‘place of conflict’ from the 1959 coup³⁰ or the number of violent incidents reported in for sector i the Armed Conflict Location and Events dataset over the period 1997-2012. Table 7 reports results for this exercise. The estimated coefficients for the duration of incorporation are small and insignificant for the number of incidents in 1997-2012 and small and marginally significant, in one specification, for the places of conflict in 1959. I view these results as supportive of the persistence of state capacity as the main channel of transmission between the historical duration of incorporation and state capacity/violence

³⁰‘lieu d’affrontement’, see the online appendix.

in 1994³¹.

[insert table 8 about here]

6.2 The persistence of state capacity

In this section I provide evidence that state capacity in Rwanda persisted from the Nyiginya kingdom until 1994, corroborating the results from the falsification exercise in the previous section. I present evidence that local state capacity persists through the colonial period, the postcolonial Rwandan state up to 2000. I review several indicators of local public good provision (Gennaioli and Rainer, 2007) and income, such as cattle ownership, road density, vaccination rates, several variables relating to public education and satellite density at night.

[insert table 9 about here]

Persistence through the colonial period: 1898-1963. Columns (1-3) of table 9 correlate the duration of incorporation with a measure of income in the colonial period, the number of 500 head of cattle in 1960 as well as with two measures of public good provision, the number of elementary schools and the number of hospitals. The data come from historical colonial maps I digitized. The duration of incorporation positively predicts the number of cattle and the number of schools. The effect on the number of hospitals has the right sign but is insignificant. State capacity predicts income and public good provision through the colonial period.

Persistence through the post-independence period: 1964-1994. Columns (4-6) report correlations of the duration of incorporation with three measures of public good provision in the period leading up to the genocide. In column (4), the dependent variable is the density of the road network in 1988. Due to the quality of the roadmap I digitalized I measure the road density at the commune level, one level above the sector level at which I usually measure outcome variables. Column (5) has the number of secondary schools in 1980, also digitized from a map (for data sources, see appendix 1). The final dependent variable, in column (6), is the percentage of people that are literate in commune c and is taken from the 1991 census.

Figure 3 gives immunization rates from the 1992 DHS survey held in Rwanda. Unfortunately, the geographical variables indicating the sector or commune are unavailable. Hence, I rely on the prefecture (highest subnational administrative level). This significantly reduces the number of observations and the results should therefore be interpreted with caution. I use data on the BCG vaccine, the vaccine against tuberculosis, since the question asking whether the respondent has had this vaccine has highest response

³¹Most importantly, this finding rules out persistence in local violence as a channel. Suppose that annexing a new district into the kingdom involved substantial violence. If this violence persists I conflate the effect of violence that is part of annexation with the duration of incorporation. This falsification exercise shows that this is not the case.

rate of all questions on immunization, making it the most representative sample. Figure 3 shows that historical state capacity positively predicts the vaccination rate in 1992. As with the colonial outcome variables, the duration of incorporation consistently predicts public good provision in the period leading up to the genocide.

[insert figure 3 about here]

Persistence 1993-2000: Satellite light density at night. Several papers have used satellite light density at night as a proxy for income (Bleakley and Lin, 2012; Henderson et al., 2012; Michalopoulos and Papaioannou, 2013). Michalopoulos and Papaioannou (2013) show, for instance, that precolonial state capacity in Africa, measure at the ethnicity level, predicts modern income, proxying for income with satellite light density. I report correlations between the duration of incorporation and the mean satellite light intensity of sector i in Panel II of Table 5. Columns (1)-(6) use the average light density over several different years as the dependent variable. Given the pervasive correlation between anthropological measures of political centralization and light density, the duration of incorporation measure should correlate with light density. Table 5 reports standardized coefficients for the light density correlations. Note that the coefficient on duration of incorporation is always positive, significant and stable, except for genocide year 1994, when it is much lower (cf. also the maps in figure 4).

[insert figure 4 about here]

6.3 Heterogeneous effects: Explanations for state capacity persistence

Differences in the persistence of state capacity may be driven by many factors. For instance, Gennaioli and Rainer (2007) and Herbst (2000) advance a ‘local accountability’ hypothesis suggesting that state capacity is more persistent due to local power structures. In places where polities were more centralized, chiefs were more accountable and this persisted through colonialism shaping development outcomes today. This explanation is in line with the history of the local administrative structure in Rwanda outlined in section 2. In contrast, Mamdani (1996) holds that indirect rule made chiefs unaccountable but in areas with centralized polities, pre-existing accountability constraints impeded this. These constraints persisted and explain, in turn, the persistence of precolonial institutions we observe. Another source of persistence is the interaction between more or less centralized polities and the colonizers. Several authors argue that more centralized precolonial polities were more successful in their interaction with Europeans and obtained, thereby, technology such as guns more easily, solidifying their rule (Claessen and Skalník, 1978; Schapera, 1956). Indeed, Osafo-Kwaako and Robinson (2013) show that precolonial political centralization is correlated with the provision of public goods such as road construction and the use of money.

These explanations for state capacity persistence fall into two categories: those that presuppose that institutions persist through the human capital of those running them or those that presuppose that the persistence is embodied in the rules/laws/conventions creating the institutions and are independent of those running them. From a ‘human capital perspective’ the persistence in Rwandan state capacity is striking since human capital was generally low and local chiefs were frequently replaced. Table 10 provides tentative evidence on this distinction by presenting results from the following regression:

$$Literacy_{id} = \beta_1 Duration_{id} + \beta_2 \mathbf{z}_{id} + \beta_3 \mathbf{z}_{id} * Duration_{id} + \varepsilon_{id} \quad (4)$$

Where $Literacy_{id}$, the literacy rate from the 1991 census for sector i , is a measure of modern public good provision. $Duration_{id}$ is the duration of incorporation. \mathbf{z}_{id} is a vector of controls, consisting of two human capital variables, the number of schools in 1960 and the number of higher education establishments (secondary schools) in 1980. The interaction term captures the idea that there might be differential persistence in state capacity, captured by the correlation between precolonial and modern state capacity for different values of the controls in the \mathbf{z} vector.

[insert table 10 about here]

Column (3) of table 7 includes the entire vector \mathbf{z} . Although the coefficients on the human capital variables and the interaction terms have a different sign, they are statistically indistinguishable from zero. This provides evidence that persistence in state capacity does not work through the human capital employed in exercising state functions and that the frequent changes of leadership and upheavals in twentieth century Rwandan history are no impediment to persistent state capacity nor to using precolonial state capacity as a proxy for modern state capacity.

7 Concluding Remarks

This paper contributes to the large and growing literature of the role of the state and politics in the development process. This paper shows that state capacity, while usually associated with positive development outcomes, was put to disastrous effect in the Rwandan genocide.

I have shown that local differences in state capacity positively, significantly and robustly predict differences in the intensity of violence in the Rwandan Genocide. I proxy state capacity by its precolonial state counterpart, measured by the duration of incorporation of a district into the Nyiginya kingdom. I

hypothesize that precolonial state capacity, measured by duration of incorporation, correlates with modern state capacity and this state capacity explains the genocide. I find strong empirical support for this chain of reasoning. However, duration of incorporation is endogenous. I use the pivotal role of cattle in the Nyiginya kingdom as a source of exogenous variation in the year of incorporation. Places that were more favourable to keeping cattle were conquered earlier. Using my cattle suitability index as an instrument I confirm the relationship between precolonial state capacity and the intensity of the violence in the genocide. I also show that state capacity persists through time connecting precolonial state capacity to modern state capacity to the intensity of the genocide. A simple falsification justifies the focus on persistent state capacity over other potential channels.

My paper sheds light on the complex relationship between state capacity, violence and development (Blattman and Miguel, 2010; Besley and Persson, 2010). I find that state capacity can have adverse effects when used by one group in society against another. Furthermore, I find that local state capacity persists through time.

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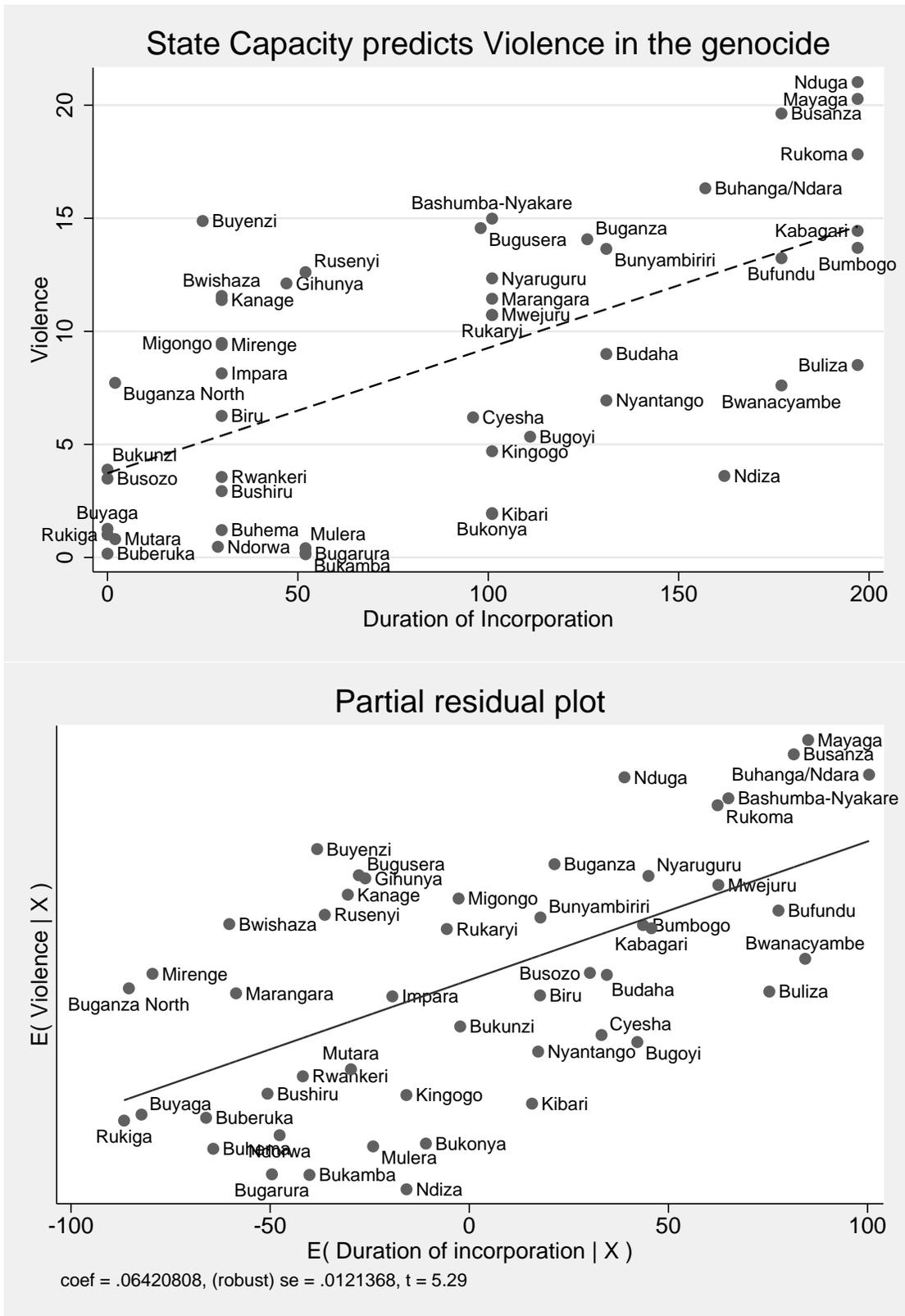
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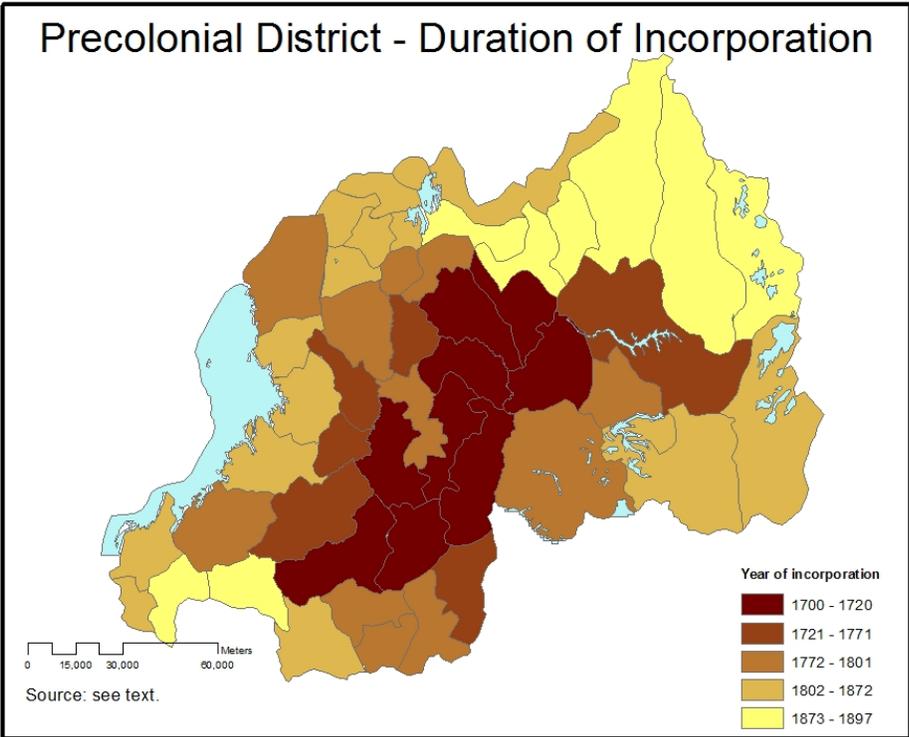
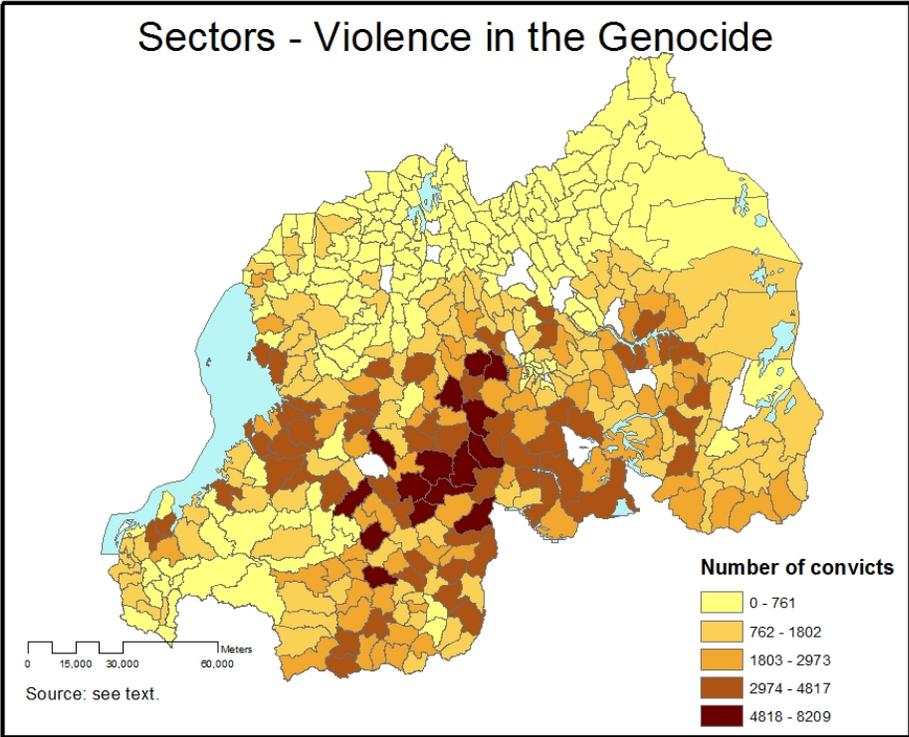
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Figure 1: The main result



The bottom figure includes the Percentage Tutsi and the Number of Gacaca courts in the X vector

Figure 2: The year of incorporation, the cattle suitability index and the intensity of violence in the genocide



The year of incorporation, the cattle suitability index and the intensity of violence in the genocide continued

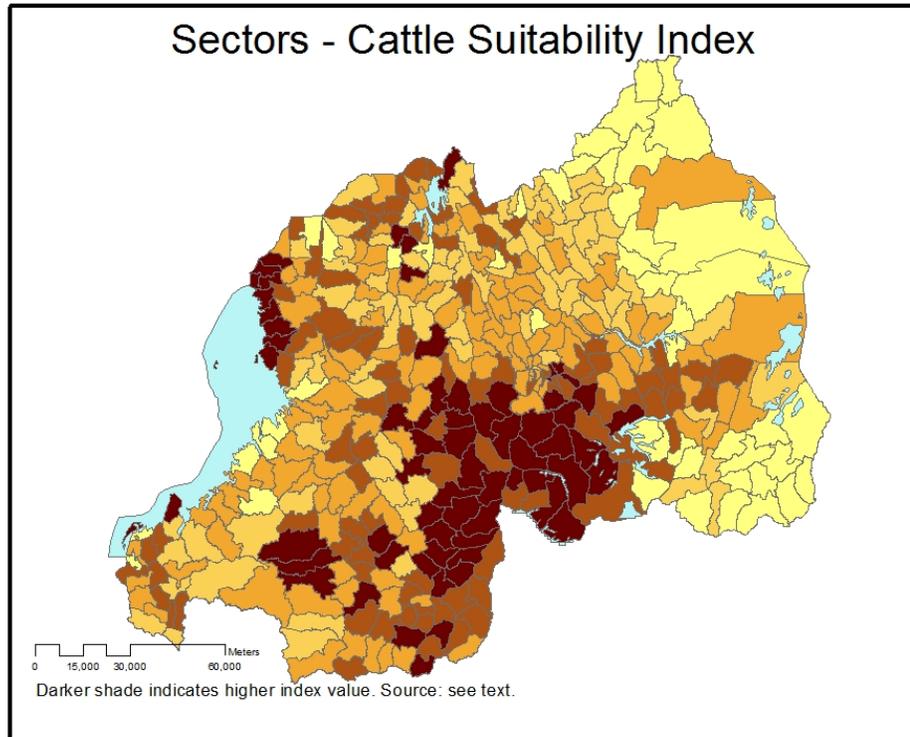


Figure 3: Vaccination rates

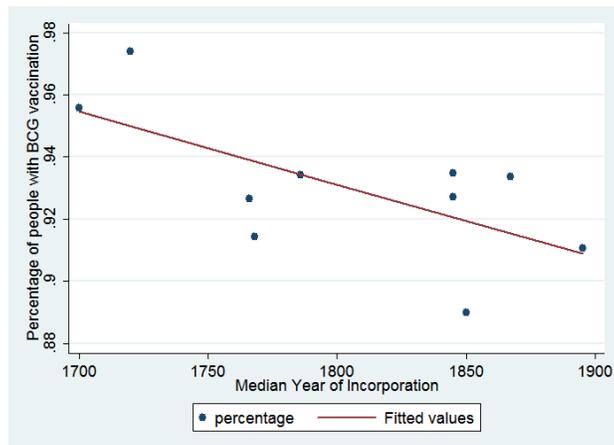


Figure 4: Mean Satellite light density for 1993 and 1994

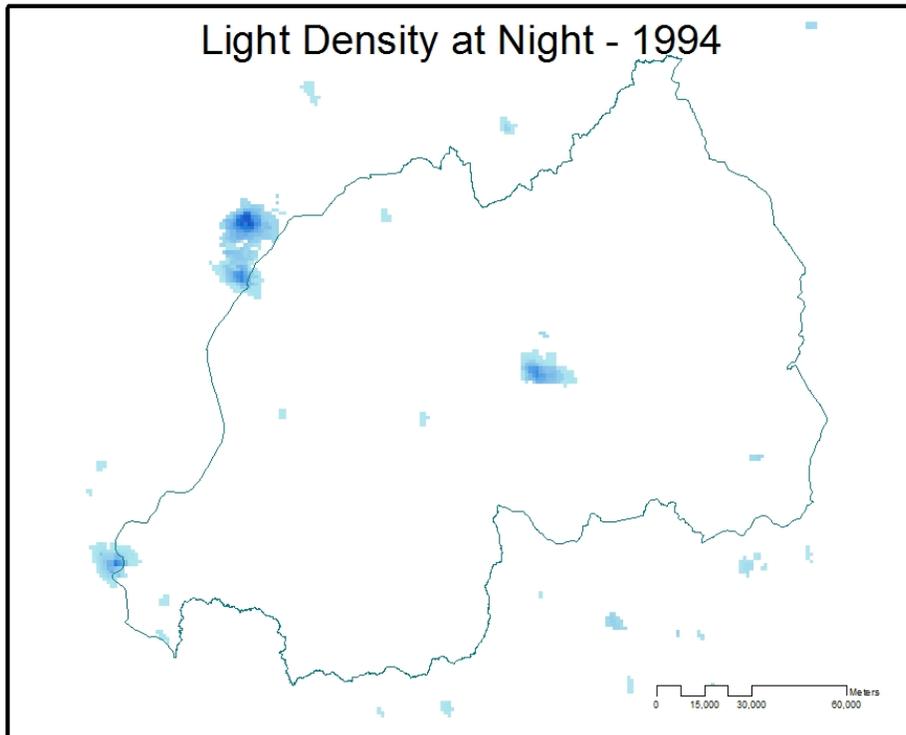
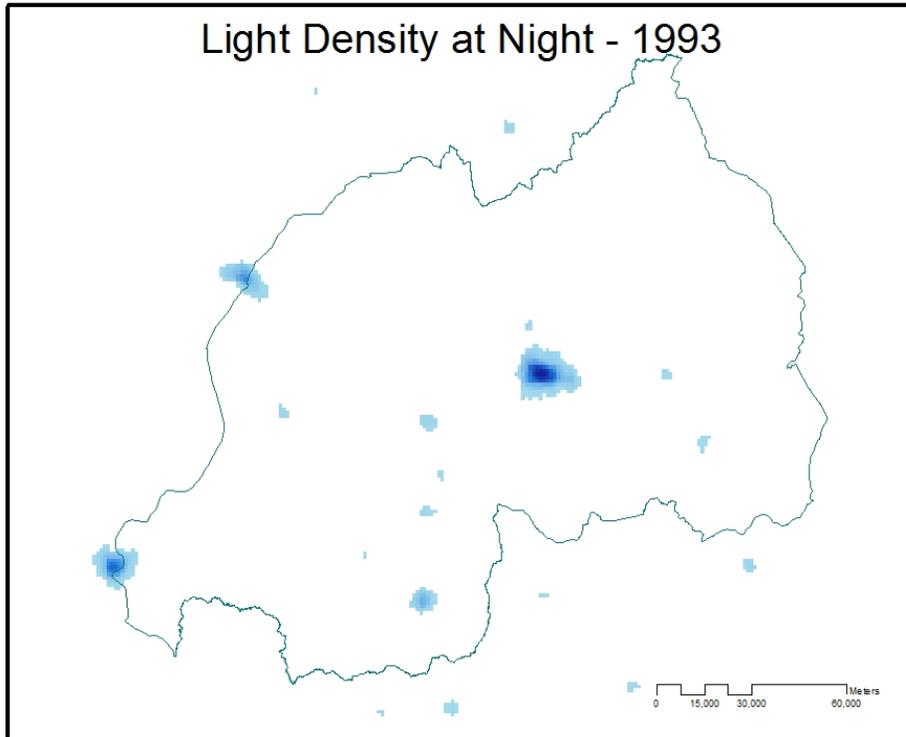


Figure 5: The timing of the genocide

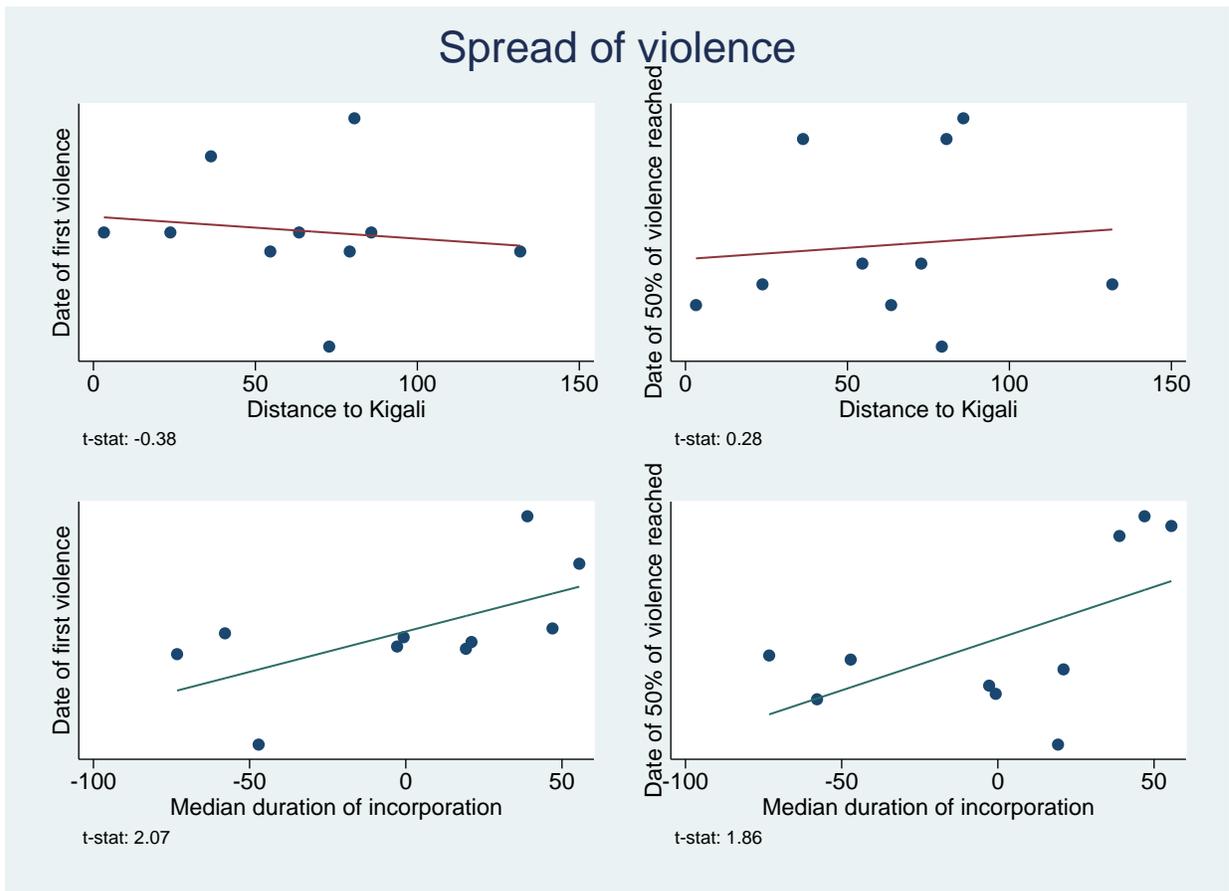


Table 1: Main Summary Statistics

	Full Sample		Below median Duration		Above median Duration		Difference	t-stat of difference
	mean	sd	mean	sd	mean	sd		
Violence	9.30	8.82	7.08	6.96	11.53	9.88	-4.777***	(-5.49)
Murder	5.00	4.85	4.01	4.17	5.99	5.27	-2.332***	(-4.84)
Duration of Incorporation	101.69	64.94	52.97	37.73	150.41	47.54	-97.94***	(-22.45)
Percent Tutsi	0.08	0.07	0.07	0.09	0.09	0.06	-0.0186*	(-2.45)
Nr. of Gacaca courts	21.78	8.25	21.02	7.21	22.55	9.12	-0.843	(-1.00)
TseTse prevalence	0.07	0.18	0.09	0.20	0.04	0.15	0.0741***	(4.10)
Slope	3.72	2.83	4.27	3.00	3.17	2.53	1.364***	(4.85)
Pasture Suitability	7286.77	1858.87	7198.74	2141.30	7374.81	1525.85	-50.14	(-0.26)
Observations	382		191		191			

The unit of observation is the administrative sector. Violence is the number of prosecutions in all three categories of the Gacaca data, normalized by population from the 1991 census. Murder is the number of prosecutions in category two of the Gacaca data, normalized by population from the 1991 census. Duration of Incorporation is the total time sector s was part of the precolonial Nyiginya kingdom. Data sources are given in the online appendix.

Table 2: Main results - OLS

<i>Dependent variable:</i>	Violence				Murder			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Duration of Incorporation	0.0526*** {0.0052} (0.0122) [0.0124]	0.0302** {0.0055} (0.0096) [0.0097]	0.0379*** {0.0034} (0.0091) [0.0093]	0.0281** {0.0039} (0.0087) [0.0087]	0.0265*** {0.0033} (0.0060) [0.0061]	0.0169** {0.0026} (0.0052) [0.0053]	0.0184*** {0.0014} (0.0043) [0.0044]	0.0159** {0.0021} (0.0047) [0.0049]
Percent Tutsi			34.08*** (7.564)	-2.140 (7.168)			20.33*** (4.027)	0.460 (4.061)
Nr. of Gacaca courts			0.262*** (0.0873)	0.252*** (0.0871)			0.120*** (0.0428)	0.134*** (0.0442)
Geographical Controls	N	Y	N	Y	N	Y	N	Y
District Fixed Effects	N	Y	N	Y	N	Y	N	Y
Colonial Districts	49	49	49	49	49	49	49	49
Communes	145	145	145	145	145	145	145	145
Observations	382	382	382	382	382	382	382	382
R^2	0.132	0.468	0.272	0.499	0.109	0.446	0.244	0.476

OLS estimates. The unit of observation is the administrative sector. Violence is the total number of prosecutions in the gacaca courts for violence normalized by population from the 1991 census. Murder is the number of prosecutions in category 2 normalized by population from the 1991 census. Duration of Incorporation is measured as 1897 minus the year of incorporation of sector s . Square brackets give Conley (1999) standard errors allowing for arbitrary spatial correlation. I have used weights such that every observation within 4 decimal degrees of the observation in question gets weight one and everything further away weight 0. Parentheses give errors clustered at the (pre)colonial district level. Braces indicate two way clustered standard errors with levels of clustering at the colonial district and commune. Communes gives the number of commune clusters used and colonial districts gives the number of colonial district clusters used in the two way clustering procedure. Fixed Effects indicates fixed effects at the modern district level. Geographical controls include the mean elevation and slope of a sector and the distance to Kigali, the border, the nearest river and to the nearest major road, measured from the centroid of sector s . * indicates significance at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

Table 3: Main results - GMM

	Violence				Murder			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Second stage: Dependent variable is violence or murder</i>								
Duration of Incorporation	0.0968*** (0.0280)	0.0857*** (0.0232)	0.0620** (0.0280)	0.0530** (0.0249)	0.0542*** (0.0161)	0.0458*** (0.0128)	0.0360** (0.0161)	0.0294** (0.0134)
Anderson-Rubin confidence interval	[0.05 - 0.18]	[0.04 - 0.14]	[0.01 - 0.15]	[0.01 - 0.11]	[0.02 - 0.09]	[0.02 - 0.08]	[0.01 - 0.09]	[0.003 - 0.06]
R^2	0.021	0.196	0.241	0.309	-0.038	0.186	0.187	0.292
<i>First stage: Dependent variable is the duration of incorporation</i>								
Cattle Suitability index	114.3*** (27.80)	107.3*** (22.91)	93.52*** (25.39)	86.93*** (20.07)	114.3*** (27.80)	107.3*** (22.91)	93.52*** (25.39)	86.93*** (20.07)
Control for perc. Tutsi	N	N	Y	Y	N	N	Y	Y
Control for nr. Gacaca courts	N	N	Y	Y	N	N	Y	Y
Geographical Controls	N	Y	N	Y	N	Y	N	Y
Colonial Districts	49	49	49	49	49	49	49	49
Angrist-Pischke F-stat	16.90	21.96	13.57	18.76	16.90	21.96	13.57	18.76
Observations	372	372	372	372	372	372	372	372
R^2	0.122	0.469	0.167	0.509	0.122	0.469	0.167	0.509

Two-step GMM estimates. The unit of observation is the administrative sector. Violence is the total number of prosecutions in the gacaca courts for violence normalized by population from the 1991 census. Murder is the number of prosecutions in category 2 normalized by population from the 1991 census. Duration of Incorporation is measured as 1897 minus the year of incorporation of sector s . Parentheses give errors clustered at the (pre)colonial district level. The Angrist-Pischke F-stat is the F-statistic of the first stage, after partialling out all control variables. Fixed Effects indicates fixed effects at the modern district level. Geographical controls include the mean elevation and slope of a sector and the distance to Kigali, the border, the nearest river and to the nearest major road, measured from the centroid of sector s . * indicates significance at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

Table 4: The Exclusion Restriction

<i>Dependent variable:</i>	Violence					Murder				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Duration of Incorporation	0.0732*** (0.0270)	0.104*** (0.0274)	0.0872** (0.0346)	0.107*** (0.0367)	0.0772** (0.0362)	0.0408*** (0.0157)	0.0579*** (0.0163)	0.0507** (0.0203)	0.0585*** (0.0210)	0.0424** (0.0214)
Percent Tutsi	27.39** (11.53)				29.25*** (7.089)	15.60** (6.286)				16.72*** (3.875)
Mean Satellite Light Density at night for 1992		-0.333*** (0.0588)			-0.399*** (0.108)		-0.176*** (0.0369)			-0.222*** (0.0621)
Number of 500 cattle			0.300 (0.277)		0.252 (0.222)			0.112 (0.161)		0.107 (0.128)
Banana Suitability				-0.0357 (0.0843)	0.00571 (0.0588)				-0.00731 (0.0499)	0.0153 (0.0368)
Coffee Suitability				-0.114 (0.213)	-0.265** (0.111)				-0.0662 (0.115)	-0.143** (0.0640)
Sorghum Suitability				0.134 (0.190)	0.254** (0.107)				0.0815 (0.102)	0.144** (0.0598)
Tea Suitability				-0.0230 (0.0583)	-0.00665 (0.0406)				-0.0216 (0.0344)	-0.0121 (0.0244)
Colonial Districts	49	49	49	49	49	49	49	49	49	49
Angrist-Pischke F-stat	14.94	16.18	13.45	11.83	10.36	14.94	16.18	13.45	11.83	10.36
Observations	372	372	372	372	372	372	372	372	372	372
R^2	0.160	0.069	0.081	0.000	0.274	0.125	0.000	0.004	0.000	0.242

Two-step GMM estimates. The unit of observation is the administrative sector. Violence is the total number of prosecutions in the gacaca courts for violence normalized by population from the 1991 census. Murder is the number of prosecutions in category 2 normalized by population from the 1991 census. Duration of Incorporation is measured as 1897 minus the year of incorporation of sector s . Parentheses give errors clustered at the (pre)colonial district level. The Angrist-Pischke F-stat is the F-statistic of the first stage, after partialling out all control variables. Fixed Effects indicates fixed effects at the modern district level. Geographical controls include the mean elevation and slope of a sector and the distance to Kigali, the border, the nearest river and to the nearest major road, measured from the centroid of sector s . * indicates significance at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

Table 5: Overidentifying restrictions

	Violence	Murder	Violence				Murder			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Second stage: Dependent variable is violence or murder</i>										
Duration of Incorporation	0.0704*** (0.0147)	0.0347*** (0.00725)	0.0582*** (0.0225)	0.0974*** (0.0175)	0.0424** (0.0173)	0.0686*** (0.0145)	0.0342*** (0.0124)	0.0506*** (0.00920)	0.0253*** (0.00982)	0.0342*** (0.00712)
R^2	0.284	0.276	0.132	0.167	0.273	0.287	0.098	0.162	0.234	0.278
<i>First stage: Dependent variable is the duration of incorporation</i>										
Distance to Gasabo	2.063*** (0.598)	2.063*** (0.598)	-0.559** (0.209)	1.870*** (0.613)	-0.733*** (0.193)	1.732*** (0.614)	-0.559** (0.209)	1.870*** (0.613)	-0.733*** (0.193)	1.732*** (0.614)
Cattle Suitability index			124.6*** (26.34)	44.01** (20.25)	95.04*** (22.40)	40.46** (19.65)	124.6*** (26.34)	44.01** (20.25)	95.04*** (22.40)	40.46** (19.65)
Control for perc. Tutsi	Y	Y	N	N	Y	Y	N	N	Y	Y
Control for nr. Gacaca courts	Y	Y	N	N	Y	Y	N	N	Y	Y
Geographical Controls	Y	Y	N	Y	N	Y	N	Y	N	Y
Colonial Districts	49	49	49	49	49	49	49	49	49	49
Angrist-Pischke F-stat	11.78	11.78	17.42	13.07	17.47	10.79	17.42	13.07	17.47	10.79
Hansen J-stat p-value			0.003	0.48	0.31	0.34	0.006	0.61	0.34	0.69
Observations	372	372	372	372	372	372	372	372	372	372
R^2	0.565	0.565	0.225	0.567	0.332	0.576	0.225	0.567	0.332	0.576

Two-step GMM estimates. The unit of observation is the administrative sector. Violence is the total number of prosecutions in the gacaca courts for violence normalized by population from the 1991 census. Murder is the number of prosecutions in category 2 normalized by population from the 1991 census. Duration of Incorporation is measured as 1897 minus the year of incorporation of sector s . Parentheses give errors clustered at the (pre)colonial district level. The Angrist-Pischke F-stat is the F-statistic of the first stage, after partialling out all control variables. Fixed Effects indicates fixed effects at the modern district level. Geographical controls include the mean elevation and slope of a sector and the distance to Kigali, the border, the nearest river and to the nearest major road, measured from the centroid of sector s . * indicates significance at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

Table 6: The potential effect of omitted variables

		Violence	Murder
Baseline controls	Extended controls	(1)	(2)
No controls	Geographic controls	8.08	18.16
No controls	Historic controls	5.81	5.57
No controls	Modern controls	-2.23	-108.55
Perc. Tutsi and Nr. of Gacaca courts	Geographic controls	-34.43	-11.25
Perc. Tutsi and Nr. of Gacaca courts	Historic controls	78.94	53.68
Perc. Tutsi and Nr. of Gacaca courts	Modern controls	-8.30	-6.93

Each cell has the following ratio $\frac{\hat{\beta}_{extended}}{\hat{\beta}_{baseline} - \hat{\beta}_{extended}}$ where $\hat{\beta}_{extended}$ is the coefficient on the variable of interest in a regression that includes the controls in the extended controls column and $\hat{\beta}_{control}$ is the coefficient on the same variable of interest in a regression that uses the controls from the baseline controls column. The coefficient are obtained from an OLS regression with fixed effects at the district level and standard errors clustered at the precolonial district level. The geographic controls include elevation, slope, distance to the nearest river, nearest road, Kigali, the border and the suitability for wheat, coffee, tea, sorghum and bananas. Historic controls include missionary presence in 1924 and 1935, the number of hospitals in 1935 and in 1960, the number of 500 head of cattle in 1960 and the number of coffee pulping centers in 1960. Modern controls include, from the 1991 census, the percentage Tutsi, the percentage of illiterate people, the percentage of people with primary or higher education, the percentage of people in prison, the percentage Burundi, the percentage of people owning a radio, population density and the number of secondary schools in 1980.

Table 7: Falsification Tests

	Incidents: 1997-2012		Violence 1959	
	(1)	(2)	(3)	(4)
Duration of Incorporation	-0.0000721 (0.000491)	0.000286 (0.000295)	0.0188 (0.0117)	0.0245* (0.0143)
Geographical Controls	N	Y	N	Y
Observations	372	372	372	372
R^2	0.000	0.029	0.000	0.000

Two stage least squares estimates. Incidents: 1997-2012 is the number of violence incidents in the period 1997-2012. Violence 1959 is a dummy for whether there was a violent encounter between Hutus and Tutsis in the 1959 coup. Parentheses give errors clustered at the (pre)colonial district level. Geographical controls include the mean elevation and the terrain slope of a sector, measured under the centroid. Distance controls consists of distance to the border, distance to the nearest river and distance to the nearest major road, measured from the centroid of sector s . * indicates significance at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

Table 8: State capacity persistence

Panel I	Colonial Persistence: 1898-1962			Independence Persistence: 1963-1994		
	Number of 500 cattle 1960 (1)	Number of Schools 1960 (2)	Number of Hospitals 1960 (3)	Road Density 1988 (4)	Number of Secondary Schools 1980 (5)	Percent Literate 1991 (6)
Duration of Incorporation	0.0200*** (0.00613)	0.0177** (0.00755)	0.000460 (0.000587)	0.0722 (0.0591)	0.00666** (0.00278)	0.000435*** (0.000116)
Geographical Controls	Y	Y	Y	Y	Y	Y
Observations	383	383	383	383	383	383
R^2	0.123	0.070	0.007	0.195	0.105	0.321

Panel II	Persistence 1993-2000: Mean Satellite Light Density at night for different years					
	1993 (1)	1994 (2)	1995 (3)	1992/93 (4)	1995/96 (5)	1992-2000 (6)
Duration of Incorporation	0.0189*** (0.00485)	0.00635*** (0.00184)	0.0145*** (0.00381)	0.0196*** (0.00487)	0.0160*** (0.00413)	0.0167*** (0.00424)
Geographical Controls	Y	Y	Y	Y	Y	Y
Observations	383	383	383	383	383	383
R^2	0.084	0.070	0.083	0.087	0.083	0.085

OLS estimates. Panel I: Number of 500 cattle is the number of 500 head of cattle in sector i . Number of Schools 1960 is the count of primary schools in 1960 in sector i . Number of hospitals 1960 is the count of hospitals and dispensaries in 1960 in sector i . Number of Schools 1980 is the number of higher education establishments in 1980. Road density is the road density at the Commune level, measured in hundreds of kilometers. Percentage literate is the percentage of people that are literate (reading and writing). Percentage No Education is the percentage of people with no education. Panel II: Satellite light density is the average pixel shading per sector for different years. Multiple years in a column heading indicates average density over these years. I report standardized coefficients. Parentheses give errors clustered at the (pre)colonial district level. In both panels, geographical controls include the mean elevation of a sector, the mean slope and the distance to the nearest river, measured from the centroid of sector s . * indicates significance at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

Table 9: Alternative Explanations

	Violence (1)	Violence (2)	Violence (3)	Violence (4)	Violence (5)	Violence (6)	Violence (7)	Violence (8)
Duration of Incorporation	0.0329*** (0.00987)	0.0322*** (0.0102)	0.0350*** (0.0106)	0.0346*** (0.0101)	0.0350*** (0.0101)	0.0350*** (0.0105)	0.0339*** (0.00994)	0.0301*** (0.00982)
Number of Schools 1960	0.157 (0.0946)							0.102 (0.102)
Number of Coffeepulping Centers		0.462** (0.219)						0.366 (0.257)
Percent Literate			-3.677 (17.09)					2.187 (14.34)
Percent employed in Military				-12.30 (58.89)				-29.92 (61.19)
Percent Burundi					-107.8* (57.67)			-80.64* (47.47)
Percent owns Radio						2.899 (8.263)		-4.504 (6.222)
Population Density							-211.4*** (66.42)	-218.3*** (107.4)
Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	382	382	382	382	382	382	382	382
R^2	0.430	0.429	0.426	0.425	0.432	0.426	0.441	0.451

OLS estimates. The unit of observation is the administrative sector. Violence is the total number of prosecutions in the gacaca courts for violence normalized by population from the 1991 census. Duration of Incorporation is measured as 1897 minus the year of incorporation of sector s . Parentheses give errors clustered at the (pre)colonial district level. All specifications include fixed effects at the modern district level. * indicates significance at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.

Table 10: Heterogeneity in state capacity persistence

	Percentage Literate 1991 (1)	Percentage Literate 1991 (2)	Percentage Literate 1991 (3)
Duration of Incorporation	0.0000817 (0.0000752)	-0.00000818 (0.0000684)	-0.0000277 (0.0000827)
Number of Schools 1960	-0.000894 (0.00129)		-0.000639 (0.00132)
Duration of Incorporation * Number of Schools 1960	0.00000631 (0.00000922)		0.00000454 (0.00000905)
Number of Schools 1980		-0.0135** (0.00527)	-0.0127** (0.00510)
Duration of Incorporation * Number of Schools 1980		0.000153*** (0.0000454)	0.000148*** (0.0000443)
Fixed Effects	Y	Y	Y
Observations	382	382	382
R^2	0.652	0.658	0.658

OLS estimates. The unit of observation is the administrative sector. Percentage Literate 1991 is the percentage of people reported literate in the 1991 census. Duration of Incorporation is measured as 1897 minus the year of incorporation of sector s . Parentheses give errors clustered at the (pre)colonial district level. Number of Schools 1960 is the count of primary schools in 1960 in sector s . Number of Schools 1980 is the number of higher education establishments in 1980. * indicates significance at the 10 percent level, ** at the 5 percent level, *** at the 1 percent level.