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Predicting Violence within Genocides

Meso-level evidence from Rwanda

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Abstract

Can we predict when and where violence will break out within cases of genocide? Given often weak political will to respond, knowing where to strategically prioritize limited resources is valuable information for international decision makers contemplating intervention. I develop a theoretical model to help identify areas vulnerable to violence during genocide. I argue vulnerability is a function of the state's coercive power and the ruling elite's control of this power from above, mediated by the strength of society's cohesion below. Violence will be delayed in areas where political and military resistance to the center is high as it takes time for extremists to exert control at the periphery. Violence will also be delayed in well-integrated communities as it takes time to break existing social bonds and destroy social capital. I draw on the case of Rwanda's 1994 genocide and examine sub-national variation in the onset of violence across the country's 145 administrative communes using survival analysis and within-case analyses comparing early and late onset in two communes. The findings have implications for international policy makers responding to ongoing genocides.

Keywords: genocide, violence, intervention, Rwanda

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Figures and tables are at the end of the paper.

1 Introduction

Within cases of genocide, can we predict when and where violence will break out? Violence in genocides and politicides has claimed the lives of somewhere between 12 and 22 million non-combatants between 1945 and 2001.¹ The figures rise if the broader concepts of democide and mass killing events are considered.² The strong international norm to prevent such enormous loss of life has prompted several systematic macro-level studies in the last two decades to identify risk factors that predispose countries to such violence.³ Today, as a result of this work, we can more readily identify vulnerable countries.

Yet the challenge is not only the prevention of such violence. It is also intervention to stop it once it has begun. Arguably, our ability to see and foresee such events has improved considerably as the global flow of information has also improved. It would be difficult today to keep killing on a massive scale from international attention. Yet a significant challenge persists in creating the political will to mobilize the finite material resources to respond to violence. Decision makers face the strategic challenge of prioritizing the limited intervention resources made available to them. Knowing when and where violence is most and least likely to break out then is valuable information. Genocides frequently involve multiple episodes of violence whose occurrence varies in time and space.⁴ Yet, in contrast with the cross-national research, we know much less about the systematic determinants of such sub-national violence. Is temporal and spatial variation in violence observed during genocides predictable? If so, can the already-identified predictors of genocide at the macro level also tell decision makers contemplating external intervention when and where violence is likely to occur at the meso or micro-levels?

I argue that violence onset within genocide is predictable. When and where violence occurs is not due purely to random factors or wholly to unique local contexts. Broadly, I contend that violence onset may be modeled as a function of the state's power from above mediated by the strength of society's cohesion from below. In places where the coercive power of the state is strong and where the ruling elite's control of this power is high, violence will occur early on. The causal logic is that the concentration of power in the state, and the absence of any constraint on the exercise of this power, permits the ruling elite to deploy the state's formidable resources against its citizens with impunity. In contrast, in areas where inter-group interaction is strong, violence will be delayed. The causal logic here is that it takes time to break or overcome inter-ethnic bonds and destroy social capital. Cohesive communities will resist pressures from above to divide them. Table 1 summarizes these predictions.

I derive this model using the case of Rwanda's genocide and examine sub-national variation in the onset of violence across the country's 145 administrative communes in 1994. Genocidal violence targeting primarily the country's ethnic Tutsi minority began on 6th April 1994,

¹ See Harff (2003).

² For democide see Rummel (1995). For mass killings see Valentino, Huth et al. (2004).

³ Rummel (1995); Krain (1997); Harff (2003); Valentino, Huth et al. (2004); Wayman and Tago (2010).

⁴ See King (2004); Straus (2007).

following the assassination of Rwanda's Hutu president, and lasted just over 100 days. Some communes experienced violence almost immediately, but others experienced violence several weeks later. To account for this meso-level variation in violence, I test competing hypotheses on genocidal onset using quantitative duration analysis and explore possible causal mechanisms using within-case analyses of two communes: one that experienced early onset, and one where onset was late. In addition to corroborating the static risk factors of state power and social cohesion identified in extant macro-level research, the meso-level approach also reveals two dynamic determinants of violence onset. The first is a temporal dynamic. The analysis shows that the rate of violence onset (or hazard rate in survival analysis) varied autonomously with time. In the Rwandan context, the hazard rate initially declined, increased, and then declined once again. The second is a feedback dynamic. The results also show violence is highly contagious. Violence breeds further violence. It is endogenous to itself. These findings reinforce the emerging consensus that genocide is better thought of as a continuous process than as a discrete event.⁵ Disaggregation of genocides in time and space can help reveal the accelerators and decelerators of this process.

The paper proceeds as follows. Section two situates the paper theoretically, setting out the hypotheses from the extant literature and their operationalization. Section three describes the research design, case selection, and the techniques used. Section four presents the results of both the quantitative and qualitative analyses, and section five discusses the policy and theoretical implications of the findings.

2 Theoretical framework and hypotheses

The comparative study of genocide has advanced considerably since the first generation of research in the 1970s and 1980s.⁶ Much of what we know today comes from two methodologically distinct literatures. The first and older body of literature draws predominantly on comparative historical analysis to trace the origins and causes of genocides.⁷ The second corpus of literature, cited previously, relies primarily on quantitative, cross-national analysis to estimate measurable predictors of genocide onset. Together, the two approaches have generated a rich set of ideas for how and why genocides occur that present opportunities for systematic hypothesis testing. Broadly, these ideas may be categorized as relating to (i) state development and regime type; (ii) social divisions and cultural differences; (iii) radical ideologies; (iv) elite survival strategies; (v) economic crises causing hardship and deprivation; (vi) political upheavals resulting from civil wars, coups, and revolutions; and (vii) past violence and atrocities.

Yet the existing comparative research, focused at the macro level, has several limitations. First, genocide is a rare event. The universe of cases is small and generalizing inferences require caution. Second, comparisons across studies are restricted by unit heterogeneity. There is no consensus on the definition of genocide that researchers should use. Moreover, some studies

⁵ See Straus (2012).

⁶ See Straus (2007).

⁷ See Horowitz (1976); Kuper (1982); Chalk, Jonassohn et al. (1990); Melson (1992); Fein (1993); Levene (2005); Mann (2005); Midlarsky (2005); Sémelin (2005); Weitz (2005).

examine analytically distinct phenomena such as politicicides, democides, and mass killing events. Third, in the case of quantitative cross-national analyses, the causal mechanisms behind identified predictors are the product of theoretical speculation. Furthermore, such analysis, which does not rely on causal research designs, cannot rule out the possibility that other unobserved variables explain the occurrence of genocide. Fourth, in the case of comparative historical analyses, very few vary the dependent variable. The studies examine only cases where genocide occurred. Exclusion of negative cases leaves these studies vulnerable to selection bias.

One promising approach to overcome some of these limitations is disaggregation. By moving from macro to meso or micro-level analysis, a potentially larger set of units to compare becomes available. These units enjoy greater homogeneity and consequently have fewer differences for which to control. Importantly, disaggregation also usually involves variation in the outcome of interest. The last decade has seen the study of social violence take a ‘micropolitical turn’.⁸ This move to disaggregate has been particularly pronounced in the study of civil wars. One key insight from this literature has been the recognition of episodes of violence within civil wars as analytically distinct from the war itself.⁹ Sub-national analysis of violence within genocides is also growing.¹⁰ The sub-national focus avoids the difficulties in defining genocide that affect cross-national analysis. Micro-level research, whose unit of analysis is typically the individual, has noticeably expanded. This research has provided rich insights into the Rwandan genocide for example.¹¹ To a lesser extent, meso-level research, where the unit of analysis typically comprises places, events, and institutions at the sub-national level, is also increasing. It includes several comparative studies of Holocaust violence.¹²

I synthesize theoretical insights from these two methodologically distinct literatures on genocide, hitherto weakly connected, to test hypotheses on the determinants of genocidal violence at the meso level. While meso-analysis offers the advantages outlined above, it also has limitations. Notably, it clearly cannot tell us why and under what conditions genocides occur in the first place. Moreover, not all the concepts that emerge from the macro-focused literature can be meaningfully operationalized at the meso level. Ideational variables such as purity, modernity, and utopia, for example, are not readily susceptible to systematic disaggregation. Limitations notwithstanding, meso-analysis may tell us why violence within genocides occurs in some places at certain times. This remains valuable information to decision makers contemplating international intervention.

2.1 State power and elite control

By most definitions, the state is necessarily implicated in the commission of genocide.¹³ In conceptualizing the state, a distinction is made between its material capabilities and its symbolic

⁸ King (2004).

⁹ Kalyvas (2006).

¹⁰ See Finkel and Straus (2012).

¹¹ See Verwimp (2005); Straus (2006); Fujii (2009); McDoom (2009).

¹² See Dumitru and Johnson (2011); Kopstein and Wittenberg (2011).

¹³ See Straus (2001).

authority.¹⁴ Genocide scholarship has emphasized the former, noting the state's power to coordinate, control, and coerce.¹⁵ The modern state possesses material capabilities to inflict harm on its civilian population on a scale more massive than almost any other actor. It can kill using its security apparatus, notably the military and police. It can also kill using its civilian apparatus, through policies that forcibly displace, starve, neglect or otherwise harm civilian communities.

H1a. The stronger the coercive capability of the state at the local level, the earlier the onset.

To operationalize coercive capability, I apply Weber's axiomatic criterion of a state holding a monopoly on legitimate force within its territory. In areas where control by the state's security forces is challenged, the state's power is by definition diminished. To measure this in Rwanda I use research mapping the territorial advance, day-by-day, of the rebel group, the Rwandan Patriotic Front (RPF).¹⁶ These micro-data indicate with precision on what day a commune was under government or rebel control during the genocide.

The second facet of a state's power, its symbolic authority, is connected to the political development of the modern state. The powerful forces behind the shift in authority from traditional bases within society to its investiture in the modern state feature centrally in several comparative studies of genocide.¹⁷ The state's ability to legitimize discrimination and violence is contingent on the recognition and acceptance of its authority. Its symbolic authority is reflected in the oft-cited perpetrator defense of 'I was just following orders'.

H1b. The stronger the symbolic authority of the state at the local level, the earlier the onset.

To measure its symbolic authority, I apply the notion that the modern state's ability to broadcast its power decreases as one travels further from the centre, where power is concentrated, to the periphery, where it is diffuse. This hypothesis has been empirically demonstrated in the context of post-colonial Africa.¹⁸ Using Geographic Information Science (GIS) software, I measure the distance from the capital city, Kigali, to the centroid point in each of Rwanda's 145 communes. The further from the centre, the weaker the state's symbolic authority at the local level.

It is not only the magnitude of the state's power, but also the governing elite's control of this power that matters. A ruling elite with unconstrained powers can take radical action to ensure its strategic survival when threatened. Several studies have consequently pointed to regime type as an important determinant.¹⁹ Autocracies, notably totalitarian regimes, are more likely to commit mass murder than democracies. Other studies emphasize the importance of the ruling elite's survival more than the form of the regime.²⁰ The underlying causal logic, however, is similar. If

¹⁴ See Mitchell (1991).

¹⁵ See Valentino (2004); Sémelin (2005).

¹⁶ See Davenport and Stam (2012).

¹⁷ See Levene (2005); Mann (2005).

¹⁸ See Herbst (2001).

¹⁹ Horowitz (1976); Rummel (1995); Harff (2003); Wayman and Tago (2010).

²⁰ Figueiredo and Weingast (1999); Valentino (2004).

no constraints exist on the exercise of the state's formidable power, the ruling elite may direct this power against individuals with impunity when its exercise of this power is threatened.

H1c. The weaker the ruling elite's control of state power at the local level, the later the onset of genocide.

To measure elite control, I examine political affiliation at the local level. In 1991, having been a *de facto* or *de jure* one-party state for most of its post-independence history, Rwanda re-introduced multipartyism. The institutional shift created 15 new political parties. In 1993, a series of local elections resulted in the defeat of the ruling party and the installation of opposition burgomasters as chief executives in several communes. With assistance from in-house experts at the International Criminal Tribunal for Rwanda, I assembled a dataset identifying communes headed by loyalist and opposition burgomasters in 1994. Opposition-controlled communes were coded 1; those held by the ruling party were coded as 0.

2.2 Social cohesion

Early research on genocide emphasized 'deep divisions' within society.²¹ These divisions could be expressed as prejudice and discrimination, and in extreme cases as dehumanization or exclusion from the moral universe.²² To capture social divisions, quantitative cross-national research has conventionally relied on measures of ethnic diversity. This approach, however, has limitations. Conceptually, it assumes more cultural diversity necessarily signifies more social conflict. Furthermore, the most common measure, the ethno-linguistic fractionalization index, is weakly sensitive to the relative sizes of groups, ignores their spatial organization, and does not capture the intensity of differences.²³

A better measure would focus on interaction between groups, rather than on the number of groups in societies. Interaction may facilitate contact and communication of information about each group and thereby reduce stereotyping and prejudice.²⁴ Alternatively, interaction may build trust and strengthen inter-ethnic bonds.²⁵ To better capture the interaction mechanism, I propose considering the spatial integration and relative sizes of social groups. Research has suggested ethnic settlement patterns affect the likelihood of ethnic violence.²⁶ Territorial concentration inhibits interaction and increases the prospects of conflict.

H2. The greater the interaction between groups at the local level, the later the onset of violence.

To measure segregation I construct for the first time in a study of inter-group violence two conceptually distinct indices that address several of the shortcomings of diversity-based

²¹ See Kuper (1982).

²² For dehumanization see Charny and Berger (1988). For moral exclusion see Fein (1993).

²³ Posner (2004).

²⁴ Allport (1958).

²⁵ Bhavnani and Backer (2000).

²⁶ Toft (2003).

measures. The first is a measure of inter-group exposure. Commonly known as the interaction index, the measure explicitly takes into account the spatial organization and relative sizes of social groups. In Rwanda, these would be the ethnic Hutu majority and ethnic Tutsi minority. The index may be interpreted as the likelihood that a randomly selected Tutsi would share the same geographic sub-division as a randomly selected Hutu.²⁷ Technically, it is the minority-weighted average of each geographic sub-division's majority proportion, denoted as I here:

$$I = \sum_{i=1}^n [x_i/X][y_i/t_i]$$

where x_i is the minority size (number of Tutsi), y_i is the majority size (the number of Hutu), and t_i is the total population of the geographic sub-division, i , (Rwandan 'sector'), and X is the overall minority size in the larger geographic unit under comparison (Rwandan 'commune').

The second is a measure of 'evenness' and is commonly known as the index of dissimilarity. Conceptually, it is the percentage of the minority (Tutsi) who would have to change their geographic sub-division (sector) in order to create an even distribution throughout the larger geographical unit (commune). Technically, it is the weighted mean absolute deviation of every geographical sub-division's minority proportion from the larger geographical unit's minority proportion expressed as a proportion of the theoretical maximum.²⁸ It is denoted by D here:

$$D = \sum_{i=1}^n [t_i|p_i - P|/2TP(1 - P)]$$

where t_i and p_i are the total population and minority proportion of the geographic sub-division, i , and T and P are the population size and minority proportion of the larger geographical unit under comparison. Together, I and D capture the concept of social divisions better than measures of social diversity. More broadly, they represent an empirical innovation from sociology that could deepen political scientists' understanding of the relationship between socio-cultural differences and violent conflict.

2.3 Security threat

A robust finding in the comparative research on genocides is that they often occur in the context of armed conflicts.²⁹ Two causal mechanisms have been suggested for why this may be so. The first is political opportunity. Breaks in the political opportunity structure created by war—or other upheavals such as revolutions and coups—increase the likelihood of genocide onset.³⁰ Challengers exploiting these opportunities threaten the incumbent elite's position of power and this elite becomes increasingly willing to undertake radical action to counter the threat.³¹ The

²⁷ Reardon and O'Sullivan (2004).

²⁸ Massey and Denton (1988).

²⁹ Harff (2003).

³⁰ Krain (1997).

³¹ Figueiredo and Weingast (1999); Valentino (2004).

second mechanism is fear. Political upheavals create intense uncertainty for the future. In the case of upheaval through war, it is uncertainty for individual and collective security. In contrast with the strategic, elite-centric focus of the opportunity mechanism, the emphasis here is on non-elite, emotional reactions to threat.³²

H3. The greater the security threat at the local level, the earlier the onset of violence.

To estimate the strength of the security threat, I measure the shortest distance from the war's front-lines to the centroid point of each commune: the further from the war, the lower the insecurity.

2.4 Hardship and deprivation

Research has also suggested that genocides often occur in times of economic hardship. On such claim relates to the notion of 'difficult living conditions.'³³ A more sophisticated claim points to 'structural violence', conceptualized as inequality, exclusion, and the humiliation of poverty.³⁴ The psychological mechanism implicit in such claims is a frustration-aggression nexus. Individuals deprived of life opportunities experience anger that may be directed toward others.

H4. The greater the deprivation at the local level, the earlier the onset of the violence.

I measure hardship and deprivation using three alternate socio-economic indicators. First, I examine educational attainment data. Specifically, I consider sub-national variation in literacy rates. Second, I consider variation in asset ownership at the local level, in particular the value of individual dwelling homes. In rural Africa, poorer homes would be built of freely available wood and mud, whereas wealthier households used baked bricks or concrete blocks that required purchase. Lastly, I consider population density. Rwanda's extraordinarily high demographic density exerted considerable ecological pressure on land and has inspired Neo-Malthusian explanations of its violence.³⁵ The effects of land scarcity would be particularly acute in an agriculture-based society.

2.5 Prior violence

Violence begets violence. The cyclical character of violence has been empirically established in research on civil wars and genocide.³⁶ Communities that have experienced violence in the past are likely to experience violence in the future. The causal reasoning follows two trajectories. Violence may recur because the conditions, processes, and actors involved in earlier violence continue to be present in affected communities. Alternatively, violence may recur because its legacy has had transformative effects on these communities. Individuals may, for example, have become habituated to violence or have acquired new grievances as a result of violence.

³² Horowitz (1985); Kaufman (2001).

³³ Staub (1989).

³⁴ Uvin (1998).

³⁵ André and Platteau (1996).

³⁶ For civil wars see Walter (2004). For genocides see Harff (2003).

H5 Communities that have previously experienced violence are more likely to experience early onset of violence.

Drawing on detailed international human rights reports from the time, I identify communes that had experienced anti-Tutsi violence in the course of Rwanda's ongoing civil war up until the start of its genocidal phase in April 1994. Communes that had experienced such violence before 6th April 1994 were coded as 1; those that had not were coded as 0.

2.6 Spatial contagion

At the sub-national level, genocidal violence may also spread through contagion. Civil war violence has had demonstrated neighborhood or spillover effects at the cross-national level.³⁷ The causal mechanisms behind contagion are potentially varied and complex. One simple pathway may be that individuals and resources associated with violence in one region may move across a border to affect an adjacent region. Combatants, refugees, weapons, and plunder may all represent vectors of transmission.

H6. The more communities that succumb to violence, the earlier the onset of violence will be in a neighbouring community.

To capture a contagion effect, I calculate the number of geographically adjacent communes that had experienced violence in the time *prior* to the onset of violence in each of Rwanda's 145 communes.

3 Research design and methods

The research design employs a mixed methods approach comprising two components: a quantitative duration analysis of violence onset across all 145 of Rwanda's communes and a within-case comparative analysis of two communes that experienced early and late onset. The selection of a meso-level unit of analysis, the commune, offers several methodological virtues: a reasonable number of units to compare; good unit homogeneity; and the prospect of variation in the dependent variable. Moreover, the commune was the most important unit of local administration in Rwanda's territorial organization. Its chief executive, the burgomaster, enjoyed extensive competences with overall responsibility for the provision of public services. Importantly for an analysis of violence, this responsibility included security at the local level. I start with a synopsis of the chosen case followed by a description of the techniques and dependent variable employed.

3.1 Synopsis of Rwanda's genocide

In April 1994, a small group of ethnic Hutu extremists seized power in Rwanda and initiated a genocidal campaign that targeted the country's ethnic Tutsi minority for extermination. The

³⁷ Sambanis (2001).

violence it unleashed was remarkable for its intensity, its ambit, and its speed. Starting on 6th April 1994, the violence would spread to almost commune in Rwanda and, within just over 100 days, would claim the lives of an estimated 507,000 to 850,000 Tutsi and several tens of thousands of the Hutu majority.³⁸ Their killers were soldiers, police, militia, and other ordinary Rwandans.

The genocide was the culmination of a civil war, begun in October 1990 and fought between a mainly-Tutsi rebel army, the Rwandan Patriotic Front (RPF), and Rwanda's Hutu-dominated government. The war's roots lay in a revolution, shortly before Rwanda's independence from Belgium in 1962, which toppled the longstanding Tutsi monarchy and installed Rwanda's first Hutu Republic that would exclude Tutsi from political power for the next three decades. The revolution had sent hundreds of thousands of Tutsi into exile and these exiles would make several unsuccessful armed attempts in the 1960s to return to Rwanda. However, it was not until the exiles' descendants initiated the civil war in 1990 and the reintroduction of multiparty politics in 1991 that the Hutu monopoly on power would weaken. In August 1993, the international community brokered a peace deal that envisaged power-sharing between the incumbent regime, the newly-formed opposition parties, and the rebel RPF. Hutu hardliners opposed the deal, however, and when Rwanda's Hutu president was assassinated on 6th April 1994 (by assassins still unknown), these hardliners seized the opportunity to take control, reignite the civil war, and initiate the genocide. Over the next three weeks violence would break out in almost every one of Rwanda's 145 communes. The international community failed to intervene and it was not until the RPF finally defeated the extremist government in July 1994 that the killing would end.

3.2 Research methods

Duration analysis

Duration or survival analysis estimates the rate at which events occur (the hazard rate). In this case, the event of interest is the onset of genocidal violence across Rwanda's communes. Duration models have two features that make them particularly suitable for this type of analysis. First, they allow for censoring. They recognize events which do not occur for the subject in the time period studied (right-hand censoring). The non-occurrence of events is not considered missing data but is instead treated as information to be used in the model. In this case, (right-hand) censoring would refer to communes that did not experience violence during the genocide. Second, duration models allow for the incorporation of time-dependent variables, that is variables whose values vary across the period of time the subject is studied. In this case, I am interested in the effect of two time-dependent co-variates: the rebel advance across Rwanda's territory during the genocide (a measure of the state's coercive capabilities) and the number of communes adjacent to the subject commune already experiencing violence (an indicator of a contagion effect).

Duration analysis usually involves a choice between continuous and discrete time analysis. As we do not know the precise instant in time at which violence broke out in each commune, the

³⁸ Prunier (1998; Des Forges (1999).

onset of violence, as with many other events, is in practice measured as occurring within discrete time intervals. In this case, onset was observed as occurring in one of seven time intervals each of three days duration. Consequently, there are many ‘tied’ events, that is communes in which the onset of violence is considered to have occurred at the same time. Two approaches are commonly used to handle such event data.³⁹ The first is to treat the data as truly discrete, usually accomplished by using a proportional odds model that would measure the likelihood (the odds) that genocidal violence will occur. It may be estimated using logistic regression where the hazard rate is given by:

$$P_{it} = 1/[1 + \exp(-\alpha_t - \beta'x_{it})]$$

where i refers to the commune subject, t refers to the time interval ($t = 1 \dots 7$), α_t refers to a set of constants equivalent to an unspecified function of time, β' refers to a $K \times 1$ vector of constants for the explanatory variables x_{it} .

This may alternatively be written in logit form as:

$$\log \left[\frac{P_{it}}{(1 - P_{it})} \right] = \alpha_t + \beta'x_{it}$$

Alternatively, one can start with a continuous time model and derive estimators appropriate for events grouped into time intervals. This is usually accomplished using the complementary log log model, a proportional hazards model that measures the risk or hazard of the event occurrence, where the hazard is given by:

$$P_{it} = 1 - \exp[-\exp(\alpha_t + \beta'x_{it})]$$

This may alternatively be written as:

$$\log[-\log(1 - P_{it})] = \alpha_t + \beta'x_{it}$$

In both models, time-dependent co-variables are incorporated by expanding the dataset so that there is a separate observation not only for each subject but also for each time period during which each subject was ‘at risk’ for the occurrence of the event. I report results from both the proportional odds and proportional hazards models. A third type of model, Cox’s semi-parametric proportional hazards model, is also popular among researchers.⁴⁰ However, as time was measured in discrete intervals resulting in many tied events and the specification included time-dependent covariates, this class of model is less well-suited to these particular data. Moreover, as it is a semi-parametric model, it would not permit us to observe the distributional form that time takes.

Duration models should incorporate the independent effect, if any, of time on the hazard rate. In this case it is possible to intuitively imagine for example that as time passes, communes increasingly succumb to violence when a tipping point during the genocide is reached. However,

³⁹ Allison (1984).

⁴⁰ Cox (1972).

a priori assumptions regarding the probability distribution of violence onset are necessarily restrictive. Instead I choose a fully non-parametric model that imposes no assumptions regarding how the hazard rate may vary autonomously with time. To estimate this, I include $k-1$ temporal dummies where k refers to the number of time intervals in the analysis.

Within case analysis

Within-case analyses may supplement and strengthen quantitative findings by providing important context and by identifying and exploring possible mechanisms at work. Their purpose then is not to test *a priori* hypotheses independently. In this paper, I draw on a comparison of two communes: Mukingo commune that experienced early onset and Taba commune, where violence began later. Figure 1 indicates their geographic location within Rwanda. Given selection on the dependent variable, the cases are susceptible to selection bias.⁴¹ They are not, however, intended to establish causal inferences. Instead, by tracing the processes that occurred within each commune, the cases may improve our understanding of how and why onset occurred earlier or later across Rwanda. The technique of causal process observation then may be usefully adjoined to quantitative analyses to better comprehend relationships between hypothesized causes and their effects.⁴²

3.3 Dependent variable

The dependent variable is violence onset, or more precisely in duration analysis, the rate of violence onset. This may be conceptualized more simply as the speed at which violence occurred in Rwanda. To avoid the risk of choosing values for my dependent variable that would support my hypotheses, I rely on a third party's coding of violence onset across Rwanda. Straus defines the onset of genocidal violence as 'public and generalized attacks against Tutsi' and triangulates 6 distinct sources to reach a best estimate of when violence first began in each of Rwanda's 145 communes.⁴³ He identifies seven different time periods, each of three days duration starting from 6th April 1994, and classifies the onset of violence in each commune into one of these seven time periods.

4 Results

4.1 Quantitative analysis

I present both simple descriptive statistics (Table 2) and findings from the multivariate duration analysis (Table 4). The multivariate analysis comprises results from two classes of model: the proportional odds (logit) model and proportional hazards (complementary log log) model. In the proportional odds model, the exponentiated coefficients are interpreted as the odds ratio for the occurrence of violence whereas in the proportional hazards model the exponentiated coefficients are equivalent to the hazard ratio. I report two specifications for each model class: a full

⁴¹ King, Keohane et al. (1994).

⁴² Collier, Brady et al. (2010).

⁴³ Straus (2006).

unrestricted model (models 1 and 3) and a more restricted, parsimonious model (models 2 and 4). The unrestricted model's specification is derived from theory and tests all possible explanatory variables, identified earlier in the theoretical framework, simultaneously. The specification includes two control variables: population size and territorial size. The parameters of the restricted model were obtained by systematically removing one variable one at a time from the unrestricted model. As these were nested models with the same number of observations, I tested the relative fit of each model using a likelihood ratio test.

I start with an analysis of the descriptive data on onset before reporting the positive findings, negative findings, and inconclusive findings with respect to the predictor variables. I then describe the robustness checks undertaken, including a check for unobserved heterogeneity or 'frailty' in the models.

Onset

The descriptive data on violence onset reported in Table 3 reveal two remarkable features of Rwanda's genocide: its nationwide ambit and its extraordinary speed. Of Rwanda's 145 communes, only nine did not succumb to anti-Tutsi violence. All were communes either controlled by the rebel group or part of the demilitarized zone at the time of the president's assassination. Moreover, the majority of communes that did succumb to violence (56.2 per cent) did so within the first six days (two time periods) following the president's assassination. The violence then ignited rapidly. However, the data also show that nearly one third of communes did not experience violence until two weeks or more after the assassination. The majority were concentrated in the central and southern prefectures of Gitarama and Butare as Figure 1 illustrates. This seemingly small variation was not, as I will show, random. It was indicative of a region's vulnerability or resistance to violence.

State coercive power

Communes where the state did not possess undisputed military control were much less likely to experience anti-Tutsi violence. In most cases, these were communes captured and controlled by the rebels as they advanced. In some cases, these were communes in an already established demilitarized zone. Formally, non-state control decreased the odds of violence occurring by 94 per cent and the hazard rate by 91 per cent, holding other variables constant. The result holds across all 4 models and at the threshold of 1 per cent statistical significance. This finding could be interpreted several ways. First, when the rebels arrived in a commune, they may have actively intervened to prevent and stop attacks against Tutsi. Second, as the rebels advanced, it may have been that a fearful Hutu population fled ahead of them leaving no-one to do the killing. Third, it may be that the government's soldiers and militia were responsible for inciting and/or committing the violence and as they gave ground, so did the violence stop. The qualitative analysis, described subsequently, suggests that at least this third mechanism was at work.

It is worth noting that in most communes the rebels arrived too late to prevent violence from breaking out (though they may have reduced the intensity of the violence). The rebels advanced from the north of the country principally in a clockwise direction. It took them over 3 months to eventually capture all 145 communes. In this time, we now know that approximately three

quarters of Rwanda's Tutsi minority were killed.⁴⁴ Note in Table 3 that for a few communes, the descriptive data show the rebels as in control but that violence nonetheless occurred. This is due to the coding rule followed. If the rebels held more than 50 per cent of a commune's territory, it was coded as rebel-held. It remained possible then that violence could occur in that part of the commune not under rebel control.

Elite control

Communes controlled by the ruling elite succumbed to violence sooner than communes controlled by the political opposition. Of all communes where violence broke out in the first three days (time period 1), 36 were controlled by the burgomasters loyal to the ruling party and only five by burgomasters belonging to opposition parties. In contrast, of all communes where violence broke out late (time period 6), 15 were controlled by opposition burgomasters and only 7 by burgomasters belonging to the ruling party. The multivariate analysis indicates that being an opposition commune decreased the odds of violence occurring by 54 per cent and the hazard rate by 44 per cent, holding all other variables constant. These results also hold for the restricted models and were statistically significant at the 5 per cent threshold (at least) across all four models.

The within-case analysis suggests the mechanism behind delayed onset may have been a power struggle for control of the commune following the president's assassination. Opposition burgomasters initially resisted pressure from the extremist elite who controlled the center until either they were replaced or co-opted. Unsurprisingly then, Butare and Gitarama prefectures, both strongholds of the political opposition, experienced onset nearly a full two weeks later following the president's assassination. Elite control, however, does not fully predict violence onset. Many communes in neighbouring Gikongoro prefecture were also headed by opposition burgomasters, but still succumbed to violence early on.

Interethnic segregation

The two segregation measures calculated indicate that Hutu and Tutsi were, on average, spatially well-integrated in Rwanda. They did not live in geographically distinct regions, but rather side-by-side as neighbors. The interaction index, which measures the likelihood that a randomly-selected Tutsi would live in the same area as a Hutu, is high with a mean score of 86.6. The dissimilarity index, which measures the percentage of Tutsi who would have to move in order to create an even distribution across the commune, is low with a mean score of 33.7 per cent. By way of comparison, black-white segregation has been considered severe in US cities only when the dissimilarity score surpasses 60 per cent.⁴⁵

There was, however, considerable variation in segregation levels between communes. Interaction scores ranged from 10.5 to 100.0; dissimilarity scores varied from 2.0 to 75.0. The multivariate analysis confirms, consistent with theory, that communes with higher levels of segregation experienced violence sooner than communes that were better integrated. However, of the two segregation indices employed, only the interaction index proved significant. How evenly

⁴⁴ McDoom (2009).

⁴⁵ Massey and Denton (1988).

distributed the Tutsi were, the measure of the dissimilarity index, is not correlated with the onset of violence. The two measures are conceptually distinct. Minority members may be evenly distributed throughout the country, but at the same time have little interaction with majority members if they are a relatively large proportion of the country. The converse is possible too.⁴⁶ Formally then, the interaction index coefficient tells us that a one percentage increase in the probability of a randomly selected Tutsi living in the same area as a Hutu decreased the odds of violence occurring by 5 per cent and the hazard rate by 4 per cent, holding all other variables constant. These findings were statistically significant at the 5 per cent threshold across all four models.

The mechanism behind ethnic segregation may be, as Allport originally suggested, the result of inter-group contact.⁴⁷ As the spatial distance between ethnic groups decreases, social interaction between them increases. Increased contact would yield more information about each group and lower discrimination, prejudice, and stereotyping. As the case analysis will show, the better-integrated community produced an initial display of ethnic solidarity immediately after the president's assassination.

Contagion effect

The results suggest violence is highly contagious. The data confirm that the greater the number of neighbouring communes already experiencing violence, the more likely a commune is itself to also succumb to violence. Each additional adjacent commune that succumbs to violence in a previous time period increases the odds of violence occurring in a commune by 71 per cent and the hazard rate by 50 per cent, holding other variables constant. These estimates are statistically significant across all four models at the 1 per cent threshold.

There are several possible mechanisms through which contagion may have worked in Rwanda. First, adjacency could first have facilitated the flow of information between communities. The order to target Tutsi as the enemy would have been quickly transmitted and learned. Second, adjacency could also have facilitated the movement of people across commune boundaries. In the Rwandan context, this may have meant either Tutsi refugees fleeing violence or roving bands of killers seeking violence. Third, adjacency could also have meant that behaviour in one community could be easily observed and imitated in a neighbouring community: the erection of roadblocks; the organization of night-time patrols; the surrounding of places of refuge are patterns of behaviour seen across Rwanda for example. As the within-case analysis will suggest, at least the second mechanism was in operation in Rwanda.

Past violence

Seven communes in the dataset had experienced significant anti-Tutsi violence prior to the president's assassination on 6th April 1994. Table 3 shows that all seven communes descended into genocidal violence immediately following the president's assassination, that is in time period 1. Past violence then perfectly predicted genocidal onset. Violence is a behaviour that, once learned, is likely to be repeated. However, a perfect predictor is a problematic estimator

⁴⁶ See Blau (1977).

⁴⁷ Allport (1958).

with binary data as it signifies quasi-separation in the data analysis. To address this issue, I employed a form of penalized likelihood instead.⁴⁸ In practice, this meant simply adding 0.5 to one observation to avoid complete separation. Nonetheless, considerable caution must be exercised in drawing inferences from these results given the small number of communes involved and the very large standard errors involved as a consequence.

Time

The passage of time also had an independent effect on onset. Testing for the removal of the six time dummies from the model confirm their collective significance. The non-parametric specification allows us to see that the relationship is non-monotonic. The coefficients initially decline and then rise again. This is also reflected in the hazard function. Figure 3 indicates the function is a U-shape: the likelihood of violence was high at the start, declined, and then increased again. The relationship then is not simply exponential. It instead suggests there exists a tipping or inflection point in resistance to the violence.

Insignificant and inconclusive effects

I found no support for a prediction of violence onset based on commune deprivation levels. None of the three hardship indicators—literacy, wealth, and population density—proved significant. Although Rwanda was overall a very poor country, there was considerable variation in wealth levels and population densities within the country. Notwithstanding this variation, deprivation levels do not predict how quickly violence broke out across communes.

The importance of two predictors, the state's symbolic authority and war-time security threat, proved uncertain. Neither variable is correlated with onset in univariate analysis. Similarly, neither variable is significant in the multivariate analysis, when specified separately. However, when specified together, both variables attain statistical significance. One possible reason for this is collinearity. Both variables are proxied by measuring spatial distances: distance to the capital and distance to the war-front. Diagnostic testing, however, does not yield a clear answer on whether these predictors should be included in the specification. A likelihood ratio test suggests the two predictors should be included in the unrestricted model specification as without them, the nested model is not a superior fit to the full model. However, Wald tests on the individual significance of each term suggest neither predictor need be included. Given this inconclusive diagnosis, I do not report models which specify the two predictors together to avoid the risk of wrongly inferring their significance.

Robustness checks

The findings are robust to alternate model specifications. Nested models are tested using a likelihood ratio test and the significance of individual parameters using a Wald test. I also test specifications using alternate measures of key predictors. State power; social cohesion; and deprivation each rely on two or three distinct operationalizations. Table 5 reports the 'frailty' of the duration models. Frailty refers to characteristics specific to individual communes, uncorrelated with the predictor variables, that may make them more or less susceptible to

⁴⁸ See Zorn (2005).

violence. Unobserved heterogeneity between individual communes may be contributing to the observed variation in violence onset. Incorporating frailty then is equivalent to testing for random effects in duration models. The incorporation of individual frailty, however, proved not to alter the findings reported in Table 4. Lastly, I test for multicollinearity. No variables had a tolerance score of less than 0.2 or variance inflation factor greater than 10.0.

4.2 Qualitative analysis

In the two case analyses that follow, I briefly describe the regional context and then trace sequentially the critical junctures in each commune's trajectory towards violence. These events are examined through the lens of the predictor variables identified in the duration analysis above in order to identify and explore possible mechanisms at work. Figure 2 summarizes the process for both communes.

*Late onset: Taba commune*⁴⁹

In Taba, genocidal violence did not begin until 19th April 1994, almost two weeks after the president's assassination. Interethnic relations in the region were historically strong. Taba was located within Gitarama, one of 11 prefectures comprising Rwanda in 1994. Situated in the center of the country, Gitarama was home to an estimated 83,000 Tutsi in April 1994, the third largest number of all Rwanda's prefectures. Historically, the Hutu of the central and southern prefectures of Gitarama and Butare had been closely associated with the Tutsi. The *Abanyanduga*, as the region's inhabitants were known, had participated in the Tutsi king's conquests of the *Abakiga* in the predominantly Hutu north. Politically, Gitarama had weak ties to the ruling MRND party. The prefecture was the birthplace of the MDR-Parmehutu, the forerunner of the opposition MDR party. It was the party that first ruled Rwanda following independence in 1962. Its latterday successor emerged with the reintroduction of multipartyism in 1991 and directed its energies towards attacking the ruling party on its poor governance record. Gitarama was the MDR's stronghold. 14 of its 17 commune burgomasters and its prefect, Fidèle Uwizeye, were party members.

The outbreak of the civil war in October 1990, popularly perceived in ethnic terms, marked a critical juncture in the trajectory toward genocide. However, in Taba, partly due to its distance from the warfront, interethnic relations remained largely unaffected. Taba was home to an estimated 4680 Tutsi in April 1994, just over 8 per cent of the population. The commune experienced no incidents of ethnic violence before April 1994. Its Hutu and Tutsi communities maintained their historically strong ethnic cohesion.

The introduction of multipartyism in Rwanda in June 1991, a second critical juncture, did, however, impact Taba. In March 1993, in an election for the position of burgomaster, the opposition MDR ousted the ruling MRND, which had controlled the commune for nearly two decades. 41 year old Taba native, Jean-Paul Akayesu, became burgomaster. Although Akayesu

⁴⁹ The evidence supporting this analysis is drawn primarily from witness statements, exhibits, and judicial findings in the case of the Prosecutor vs. Akayesu at the International Criminal Tribunal for Rwanda.

commanded widespread popular support within the commune, his MRND rival, Silas Kubwimana, persisted in actively opposing him. In the run-up to the genocide, tensions in Taba would continue to follow party rather than ethnic lines.

When the president was assassinated on 6th April 1994, Taba's new burgomaster initially resisted the extremist center and opposed the violence. He created a safe haven for many of the incoming Tutsi refugees at his own commune offices and assigned 3 of the commune's 10 policemen to protect them. He also addressed Taba's population on the importance of standing together, Hutu and Tutsi alike, and organized civilian day and night patrols to prevent pro-violence elements from entering Taba. Consistent with their historic ethnic solidarity, Taba's residents initially heeded their burgomaster. Hutu and Tutsi together resisted the attempts from outside to subvert the commune's peaceful order.

Contagion violence from neighbouring communes was initially weak in Taba. Although it shared its northern border with Kigali-Rural, a prefecture where violence had begun early on, the Nyaborongo river flowed along the frontier. The river created a natural barrier to incursions from Shyorongi and Musasa communes in Kigali-Rural. Moreover, the three other communes adjoining Taba were situated within Gitarama and also opposed the violence. As time passed, however, contagion pressures mounted. The number of Tutsi refugees increased, and so too did the number of outside armed incursions. In two notable incidents, vehicles carrying soldiers and *interahamwe* militia attacked the Tutsi refugees at the commune office and were repelled by the communal policemen stationed there. In other incidents, collaborators from within Taba helped outside attackers enter the commune and target Tutsi homes.

With the passage of time, pressure from the center also mounted and control of the region slipped from the opposition to the extremists. At the prefectural level, prefect Uwizeye struggled to maintain his authority as his fellow party members and his administrative and security staff separated into extremist and moderate factions. The interim extremist government's move on 12th April 1994 from the capital Kigali to Gitarama sealed the prefecture's fate. 1000 or so *interahamwe* militia accompanied the relocation and with their arrival, effective control of the prefecture passed to the extremists.

In Taba, the balance of power tipped in favor of the extremists following a fateful meeting on 18th April 1994 that resulted in burgomaster Akayesu switching sides. Rwanda's new Prime Minister, Jean Kambanda, ordered the meeting to be held in his government's new offices in Gitarama so that he, his new ministers, and extremist party leaders could directly address the prefecture's resistant leaders. The Prime Minister read a prepared statement calling for national unity and then invited extremist party leaders to address and threaten the burgomasters more directly.

The next day, events took a significant turn in Taba. Akayesu addressed several hundred Taba residents and urged them now to unite and hunt down the 'accomplices' of the rebel enemy. This was widely understood to mean the Tutsi. His words presaged the mass killing over the next two days of Taba's Tutsi population. Having resisted them previously, Akayesu now welcomed the *interahamwe*, including their honorary vice-president, Silas Kubwimana, his former rival in

Taba. The militia and the military occupied his commune offices and led attacks, now with the collaboration of Taba residents. The situation continued until June 27th 1994 when Akayesu fled the commune ahead of the rebels' arrival. The burgomaster would be subsequently convicted of inciting and participating directly in the genocidal violence in Taba.

*Early onset: Mukingo commune*⁵⁰

In Mukingo, violence began in the morning of 7th April 1994, the day immediately following the president's assassination. The commune was located in the northern prefecture of Ruhengeri, a region where Tutsi historically held a marginal status. Together with Gisenyi prefecture, Ruhengeri was once the site of nine Hutu principalities whose inhabitants, the *Abakiga*, had resisted annexation by the Tutsi monarchy until the early twentieth century. In 1994, only 0.5 per cent of Ruhengeri's population was Tutsi, the smallest concentration in all Rwanda. Politically, the region had benefited from close connections to the center. A significant proportion of the ruling party elite and president Habyarimana himself originated from the north. Moreover, all 16 of Ruhengeri's commune burgomasters and its prefect, Sylvester Bariyanga, were staunch supporters of the ruling MRND.

When the war began in 1990, Mukingo found itself close to its frontline and the heightened insecurity was accompanied by a rapid deterioration in interethnic relations. Mukingo was home to just under 600 Tutsi in April 1994, a mere 1.3 per cent of its overall population. The local Hutu elite distrusted the Tutsi community and saw them as potential collaborators with the rebel enemy. Mukingo's burgomaster, Juvénal Kajilijeli, went so far as to draw up lists of Tutsi resident in his commune. Yet Tutsi suffered more than mere suspicion. In reprisal for a rebel attack on Ruhengeri's capital in January 1991, several hundred Bagogwe Tutsi were killed in state-sanctioned massacres in communes across the north, including Mukingo. As a consequence many Tutsi had fled the region long before the genocide began. A second consequence of the war's proximity was the region's rapid militarization. In neighbouring Nkuli commune, an important military camp was established to defend the regime's territorial control. The camp would not only train the local interahamwe, but would also provide the weapons used to eliminate the local Tutsi community during the genocide.

In contrast with the war, the introduction of multipartyism in 1991 changed little in Mukingo. The MRND ruled without challenge and no other party, save the radical anti-Tutsi CDR party, operated openly within the commune or the prefecture. Moreover, the distinction between party and state was in practice nonexistent. Mukingo's burgomaster from 1988-93 and during the latter half of the genocide, Juvénal Kajilijeli, was an MRND loyalist. Before the genocide, Kajilijeli had personally trained a group of 80 MRND interahamwe whom he would also command during the genocide. These party militia represented a far more powerful force within the commune than the nine policemen of the state. Kajilijeli, a native of Mukingo, was also a known ethnic extremist. He was removed from office in 1993 at the request of the rebel group, the Rwandan Patriotic Front (RPF), during peace negotiations for his alleged involvement in reprisal killings against Tutsi. The suspicious death of his successor, Emmanuel Harerimana, at the start of the

⁵⁰ The evidence supporting this analysis is drawn principally from the cases of the Prosecutor vs. Kajilijeli, the Prosecutor vs. Nzizorera, and the Prosecutor vs. Setako at the International Criminal Tribunal for Rwanda.

genocide, possibly at Kajilileli's hand, led to Kajilijeli's eventual reinstatement as burgomaster in June 1994.

The ruling party then exercised strong control over the commune before the genocide. Its influence was principally attributable to another native son, Joseph Nzirorera. Nzirorera held the prominent position of National Secretary of the ruling party and he took a strong interest in the fortunes of his native commune. As the civil war escalated, Nzirorera would regularly travel on weekends to Mukingo and chair meetings with the commune's local elite to discuss Mukingo's role in the MRND's political and military struggle with the RPF. It was alleged, but unproven that these meetings also planned the extermination of the Tutsi in the area. Nzirorera was also the political patron and longstanding friend of burgomaster Kajilijeli, who in part owed his status to his association with Nzirorera. At a time when few communes possessed telephones, Nzirorera was able to communicate his instructions to Kajilijeli, both before and during the genocide, through the line installed in the commune office.

Rwanda's military establishment also exerted influence in Mukingo. The sector commander for Ruhengeri with overall responsibility for the nearby Mukamira camp, Augustin Bizimungu, attended the meetings Nzirorera chaired in Mukingo. Bizimungu would go on to become overall commander of the interim government's forces during the genocide. A second prominent military figure, Lieutenant-Colonel Ephrem Setako, also attended the meetings. A native of neighbouring Nkuli commune, Setako was Head of Legal Affairs within the defence ministry. Like Nzirorera, he too served to link a peripheral commune to the decision-making center.

When news of the president's assassination reached Mukingo, there was no question of the commune following the center's directives. Burgomaster Kajilijeli, acting upon Nzirorera's telephoned instructions, called a meeting in a local canteen that same evening. There, the region's local Hutu elite, including Nkuli commune's burgomaster, agreed to execute a plan to eliminate the area's Tutsi population. The next morning, 7th April 1994, Kajilijeli brought weapons from the Mukamira military camp and distributed them to the interahamwe from Nkuli and Mukingo communes. Over the next two days, these interahamwe would eliminate the majority of the Tutsi in the two communes. Kajilijeli, in regular communication with Nzirorera, would then go on to expand the interahamwe to 600 men, drawn from the civilian population, and instruct them on when and where to attack the remaining Tutsi throughout the region.

The contrasting case studies provide some analytical insight into the mechanisms behind several of the determinants of onset identified in the quantitative analysis. The burgomaster's political affiliation mattered because it was a strong indicator of state control at the local level in Rwanda. In Mukingo, the center's control was assured because the burgomaster was an MRND loyalist and personal friends with a senior party member. In Taba, the burgomaster belonged to the opposition and had no ties to the extremist elite at the center. It took time then for this extremist elite to overcome the burgomaster's resistance and establish control over the commune. Second, military control of the commune ensured the material means to enforce authority and to implement violence. In Mukingo, a military camp trained the local interahamwe militia and supplied weapons for the violence. In Taba, the commune police enforced the burgomaster's peace until the arrival of interahamwe militia from outside overwhelmed them numerically. Third, the segregation predictor indicated potentially poor interethnic relations. It would take

longer to break communal bonds in well-integrated communities. In Taba, Hutu and Tutsi initially worked together for several days following the president's assassination before separating. In Mukingo, no such ethnic solidarity occurred. Lastly, contagion mattered because pro-violence individuals could move across borders to commit and encourage violence in adjacent communities. In Taba, the contagion effect was weak because the Nyabarongo river limited such incursions and because neighbouring communes were also anti-violence. In Mukingo, pro-violence military and militia were present in neighbouring Nkuli commune and faced no constraint to enter and commit violence next door.

5 Discussion and conclusion

At a basic level, the paper identifies robust predictors of violence onset within genocide and proposes a theoretical model for conceptualizing a region's vulnerability to violence. It suggests that the occurrence of violence during genocides may be thought of as a function of the extent of the state's power at the local level mediated by the strength of society's cohesion at the local level. State power and social cohesion do not, however, explain the occurrence of genocide. They merely help predict when and where violence may occur within genocide. The findings also raise three issues that merit deeper discussion.

First, the findings ask us to interrogate the nature of the state's power and its relationship to genocidal violence. In particular, the findings highlight two dimensions of this power: its distribution and its constraint. The relative distribution of power within a polity, and not only its absolute level, matters for violence onset. The concentration of power at the center facilitates rapid killing on a massive scale; its diffusion to the periphery hinders it. Rwanda was a highly centralized state and the center could readily project its power throughout the country.⁵¹ The few communes that resisted the central government's directives were those under opposition or rebel control. One possible implication then is that an institutional design that distributed power more diffusely within a polity may make killing at the speed seen in Rwanda more difficult to achieve. Federations for example, where power is divided between a center and regions, may help to impede violence. It is possible that other constitutional systems that distribute power differently may also retard violence. Consociations, where executive power is shared, or Montesquieu-inspired systems, where power is separated between executive, legislative, and judicial branches of government, are other potentially favorable designs.

Yet it is not simply the concentration of power that matters; it is also the constraints on its exercise. The qualitative analysis highlighted the governing elite's ability to misuse the state's power. In the early onset community, both the burgomaster and army commander were party loyalists with personal connections to the party's central elite who readily misappropriated their civilian and military offices to commit genocide. Throughout Rwanda the ruling party was virtually synonymous with the state.⁵² Power flowed through private connections largely unconstrained by formal institutional rules. Only in opposition communes, where the ruling elite's network did not extend far, was resistance offered. Private control of public power is

⁵¹ Straus (2006).

⁵² Prunier (1998).

obviously problematic. When formal institutions can be subordinated to party, ethnic, personal or other private interests, the state's power may be readily abused. The implication then would be that stronger institutional independence, or the rule of law more broadly, would constrain the misuse of the state's power to commit violence. It would take time to subvert institutions whose formal authority limits are well-established and recognized. Violence would consequently be impeded.

Second, the findings suggest that genocide is better conceptualized as a continuous process than as a discrete event. This process comprises distinguishable episodes of violence whose occurrence varies in time and space. Concentrated state power that is unconstrained accelerates this process; high social cohesion decelerates it. Rwanda's violence was the result of an extraordinarily rapid process. This conceptualization of genocide as a process has several implications. Most obviously, it implies that violence is an analytically distinct phenomenon from genocide itself. Violence possesses its own determinants, a point already recognized in the study of civil wars.⁵³ Less obviously, its conceptualization as a process implies genocide possesses internal dynamics that deserve further elucidation. This project has hinted at certain temporal and spatial dynamics within genocide. There is evidently a temporal dimension to all processes. As already described, the process of genocide is susceptible to both accelerators and decelerators and time is a component of the dependent variable, the rate or speed of violence onset. Time, however, also matters as an independent variable. Intuitively, one might imagine that as more time elapses, more communities will succumb to violence. In Rwanda the hazard rate (the rate at which communities succumbed to violence) assumed a more complex distributional form. Rather than an exponential function, we see hazard function was non-monotonic. This finding suggests that genocide, and perhaps other complex, aggregated violent phenomena, should be studied diachronically. Some research is already being conducted in this regard. For example, Davenport examines how the *intensity* of violence in Rwanda's genocide changes with the passage of time.⁵⁴

There is also an important spatial dynamic to genocide, evident in the finding that genocidal violence is highly contagious. Violence breeds further violence or, expressed differently, violence is endogenous to itself. The idea is not novel. The possibility of a feedback dynamic in violent phenomena such as ethnic warfare has already been acknowledged.⁵⁵ The paper, however, refines this observation a little further. It finds violence begets violence *in spatially adjacent areas*. This finding may account in part for two remarkable features of Rwanda's violence: its speed and geographic ambit. The violence spread in just over 100 days to almost every commune in the country. In the fourth smallest and most densely-populated country in Africa, it is unsurprising that contagion effects from spatial adjacency are likely to be amplified. More broadly, however, the finding suggests scholars should pay increased attention to spatial factors when accounting for dynamic variation in violence. When violence occurs may depend on where violence is located.

⁵³ Kalyvas (2006).

⁵⁴ Davenport (forthcoming).

⁵⁵ Kaufman (2001).

Third, the findings have potential policy implications for decision makers at the international level on when and where limited intervention resources could be applied to stop violence. In the simplest scenario, peacekeepers could be deployed to regions most vulnerable to violence. The aim would be to prevent or to stop violence in its earliest stages. However, as in Rwanda, it is possible the violence is too rapid or the resources too scant to stop determined killers. In this scenario, it may be strategically expedient to target regions less vulnerable to violence instead. The delay to the violence in such communities would provide the time needed to deploy peacekeepers preventatively. Peacekeepers would then face the easier challenge of a peace to keep rather than a conflict to end. The presence of peacekeepers would also strengthen extant local resistance from moderate elites and cohesive communities opposed to violence. Together, international peacekeepers and cooperative local communities could help turn areas within resistant regions into safe havens for resident civilians and for refugees from more vulnerable regions. It is evidently easier to protect several well-delimited areas than an entire country.

Deciding when and where to deploy intervention resources raises complex strategic and ethical questions. I have described only two relatively simple scenarios. In Rwanda, it has been argued that relatively few additional lives could have been saved through external intervention because the true nature and scale of the violence was not known at the outset and because the violence occurred too rapidly to deploy the level of resources needed to stop it.⁵⁶ Today, the proliferation of superior technologies to disseminate information rapidly and widely means it is unlikely a knowledge gap would represent as significant an impediment to intervention. However, the speed of the violence and the limited intervention resources available would still represent important challenges to overcome. The UN Force Commander on the ground, Romeo Dallaire, commanded just over 2,500 peacekeepers at the genocide's start. This contingent was thereafter reduced to 454 men. The force then was evidently unequal to the task of protecting hundreds of thousands of civilians dispersed across over 26000 square kilometers. However, contrary to the claims of humanitarian intervention skeptics, this paper suggests that something more could have been done had better information on when and where violence would break out been available. There existed a window between 6-20 April 1994 in the central and southern prefectures of Gitarama and Butare where peacekeepers could have been deployed before the violence began to reinforce the resistant communities there. Their presence may have delayed violence yet further and possibly have bought enough time to establish a corridor for civilians to cross Rwanda's southern border into Burundi. The potential upside was not insignificant. The two prefectures were home to nearly one third of Rwanda's Tutsi population in 1994 and had drawn many more Tutsi from other prefectures who saw Butare and Gitarama as places of final refuge during the bloodshed.

One outcome of the State Failure Task Force in the 1990s was a list of countries creating a global map identifying those countries most at risk of genocide and politicide.⁵⁷ The challenge for the next generation of research is perhaps to construct maps of sub-national vulnerabilities or 'violence flashpoints' *within* these identified countries. Armed in advance with this information, international decision makers may be able to deploy limited intervention resources more effectively and more quickly to stop killing once it has begun.

⁵⁶ Kuperman (2000).

⁵⁷ Harff (2003).

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Table 1. Modeling Genocidal Violence Onset at Sub-national level			
		State power	
		High	Low
Social Cohesion	High	<i>Intermediate onset</i>	<i>Late or no onset</i>
	Low	<i>Early onset</i>	<i>Intermediate onset</i>

Source: Author's compilation.

Table 2: Variable definitions and descriptive statistics

Variable	Variable Definition	Mean	Std. Dev.	Min.	Max.
State coercive power	Military control of commune: 0 if under government control, 1 if under rebel control or in demilitarized zone. Time dependent.	0.20	0.40	0	1
State symbolic power	Distance in km from capital Kigali to the centroid point of each commune	61.93	30.88	1.59	146.25
Elite control	Party affiliation of commune head (burgomaster): 0 if belongs to ruling party, 1 if belongs to opposition political party	0.26	0.44	0	1
Social cohesion I	Interaction/exposure index of interethnic segregation. Measures (0-100) likelihood of a randomly selected Tutsi sharing an area with a Hutu	86.57	10.54	48.00	100.00
Social cohesion II	Dissimilarity index of interethnic segregation. Measures percentage of Tutsi who would need to relocate to achieve an even distribution throughout commune	33.71	16.23	2.00	75.00
Security threat	Distance in km from warfront/ceasefire line on 5 th April 1994 to the centroid point of each commune	54.36	39.48	0.21	134.87
Wealth	Percentage of commune population living in dwelling homes made of either brick or concrete block	21.84	19.88	0.31	84.25
Population density	Inhabitants per square kilometer in each commune	437.39	388.87	51.11	4274.02
Literacy level	Percentage of commune population able to read and write (male only)	21.43	3.11	16.14	39.00
Contagion	Number of immediately adjacent communes in which genocide already underway. Time dependent	0.78	1.18	0	6
Past violence	Prior occurrences of anti-Tutsi violence between civil war start (Oct 1st 1990) and genocide start (6 th April 1994): 0 if no past violence, 1 otherwise	0.08	0.27	0	1
Area	Area in square kilometers of each commune	166.58	184.86	28.08	1121.12
Population size	Number of inhabitants in each commune as of last census in 1991	49362	16750	25154	121836

Source: Author's data and compilation.

Table 3. Number of Rwanda's communes that experienced genocidal onset in each time period and their distribution across categorical and time-dependent variables

Time period	Onset	Elite Control		Past Violence			Contagion		State Coercive Power	
		Ruling party	Opposition party	No past violence	Past violence	No contagion	Contagion effect	Adjacent commune total	Government control	Rebel control or DMZ
1 (Apr. 6-8)	43	36	5	36	7	43	0	0	41	2
2 (Apr. 9-11)	25	17	6	25	0	4	21	29	22	3
3 (Apr. 12-14)	8	7	1	8	0	1	7	13	6	2
4 (Apr. 15-17)	3	2	1	3	0	0	3	4	3	0
5 (Apr. 18-20)	12	3	9	12	0	6	6	9	12	0
6 (Apr. 21-23)	15	5	7	15	0	3	12	29	15	0
7 (Apr. 24+)	6	4	2	6	0	0	6	25	6	0
No onset	9	9	0	9	0	3	6	11	0	9
Total	121	83	31	114	7	60	61	120	105	16

Source: Author's data and compilation.

Table 4: Proportional odds and proportional hazards models predicting genocidal onset across Rwanda's communes in 1994

	Logit models Odds ratio (n=360)		Comp. log log models Hazard ratio (n=360)	
	Model 1 (unrestricted)	Model 2 (restricted)	Model 3 (unrestricted)	Model 4 (restricted)
State coercive power	0.06 ^{***} (0.04)	0.13 ^{***} (0.08)	0.09 ^{***} (0.05)	0.17 ^{***} (0.09)
Elite control	0.46 ^{**} (0.15)	0.40 ^{***} (0.12)	0.56 ^{**} (0.15)	0.51 ^{***} (0.12)
Social cohesion I	0.95 ^{**} (0.02)	0.96 ^{**} (0.02)	0.96 ^{***} (0.02)	0.96 ^{**} (0.02)
Social cohesion II	4.56(5.84)		3.09(3.14)	
Security threat	0.99(0.01)	0.99(0.01)	0.99(0.00)	1.00(0.00)
Population density	1.00(0.00)		1.00 [*] (0.00)	
Literacy	0.95(0.08)		0.95(0.06)	
Wealth	0.99(0.01)		0.99(0.01)	
Past violence	150.11 ^{**} (324.81)	100.56 ^{**} (210.99)	50.51 ^{***} (70.43)	34.59 ^{**} (47.72)
Contagion	1.71 ^{***} (0.25)	1.68 ^{***} (0.24)	1.50 ^{***} (0.17)	1.48 ^{***} (0.16)
Area	1.00(0.00)		1.00(0.00)	
Population size	1.03 [*] (0.01)	1.03 ^{***} (0.01)	1.02 [*] (0.01)	1.02 ^{***} (0.01)
Time1	1.76(1.26)	1.84(1.29)	1.43(0.75)	1.50(0.80)
Time2	1.41(0.94)	1.39(0.91)	1.18(0.56)	1.13(0.55)
Time3	0.57(0.41)	0.53(0.38)	0.56(0.31)	0.53(0.30)
Time4	0.23 [*] (0.20)	0.22 [*] (0.19)	0.25 [*] (0.18)	0.24 ^{**} (0.17)
Time5	1.88(1.27)	1.78(1.19)	1.33(0.63)	1.26(0.61)
Time6	3.94 [*] (2.89)	3.43 [*] (2.48)	2.52 [*] (1.24)	2.32 [*] (1.14)

Note: Dependent variable is genocidal onset (0=no onset, 1=onset). Robust standard errors in parentheses. ^{*}/^{**}/^{***} statistical significance at 10%, 5%, and 1% levels.

Source: Author's data and compilation.

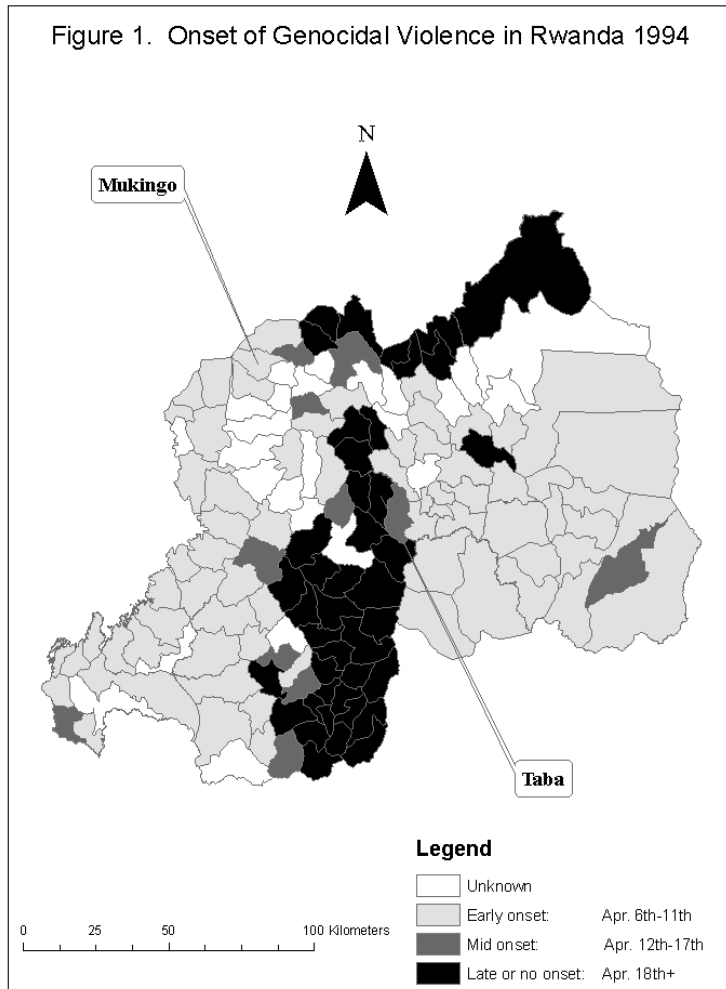
Table 5. Proportional odds and proportional hazards models predicting genocidal onset across Rwanda's communes in 1994 (incorporating frailty)

	Logit models Odds ratio (n=360)		Comp. log log models Hazard ratio (n=360)	
	Model 5 (unrestricted)	Model 6 (restricted)	Model 7 (unrestricted)	Model 8 (restricted)
State coercive power	0.06 ^{***} (0.04)	0.09 ^{**} (0.09)	0.09 ^{***} (0.07)	0.15 ^{***} (0.11)
Elite control	0.46 ^{**} (0.15)	0.33 ^{**} (0.18)	0.55 [†] (0.18)	0.47 ^{**} (0.18)
Social cohesion I	0.95 ^{**} (0.02)	0.95 [†] (0.03)	0.96 ^{**} (0.02)	0.96 ^{**} (0.02)
Social cohesion II	4.56(5.85)		3.16(3.36)	
Security threat	0.99(0.01)	0.99(0.01)	0.99(0.01)	0.99(0.01)
Population density	1.00(0.00)		1.00 [†] (0.00)	
Literacy	0.95(0.08)		0.95(0.07)	
Wealth	0.99(0.01)		0.99(0.01)	
Past violence	150.49 ^{**} (326.56)	184.85 [†] (509.40)	54.82 ^{**} (88.12)	45.62 ^{**} (80.92)
Contagion	1.72 ^{***} (0.26)	1.86 ^{**} (0.49)	1.52 ^{***} (0.24)	1.55 ^{**} (0.27)
Area	1.00(0.00)		1.00(0.00)	
Population size	1.03 [†] (0.01)	1.03 [†] (0.02)	1.02(0.01)	1.02 [†] (0.01)
Time1	1.76(1.26)	1.34(1.33)	1.37(0.89)	1.28(0.90)
Time2	1.41(0.94)	1.11(0.90)	1.14(0.63)	1.02(0.59)
Time3	0.57(0.41)	0.46(0.37)	0.55(0.31)	0.51(0.30)
Time4	0.23 [†] (0.20)	0.20 [†] (0.18)	0.25 [†] (0.18)	0.24 ^{**} (0.17)
Time5	1.88(1.27)	1.75(1.24)	1.33(0.63)	1.27(0.63)
Time6	3.94 [†] (2.90)	3.82 [†] (3.05)	2.54 [†] (1.27)	2.41 [†] (1.28)

Dependent variable is genocidal onset (0=no onset, 1=onset). Robust standard errors in parentheses. ***/** statistical significance at 10%, 5%, and 1% levels

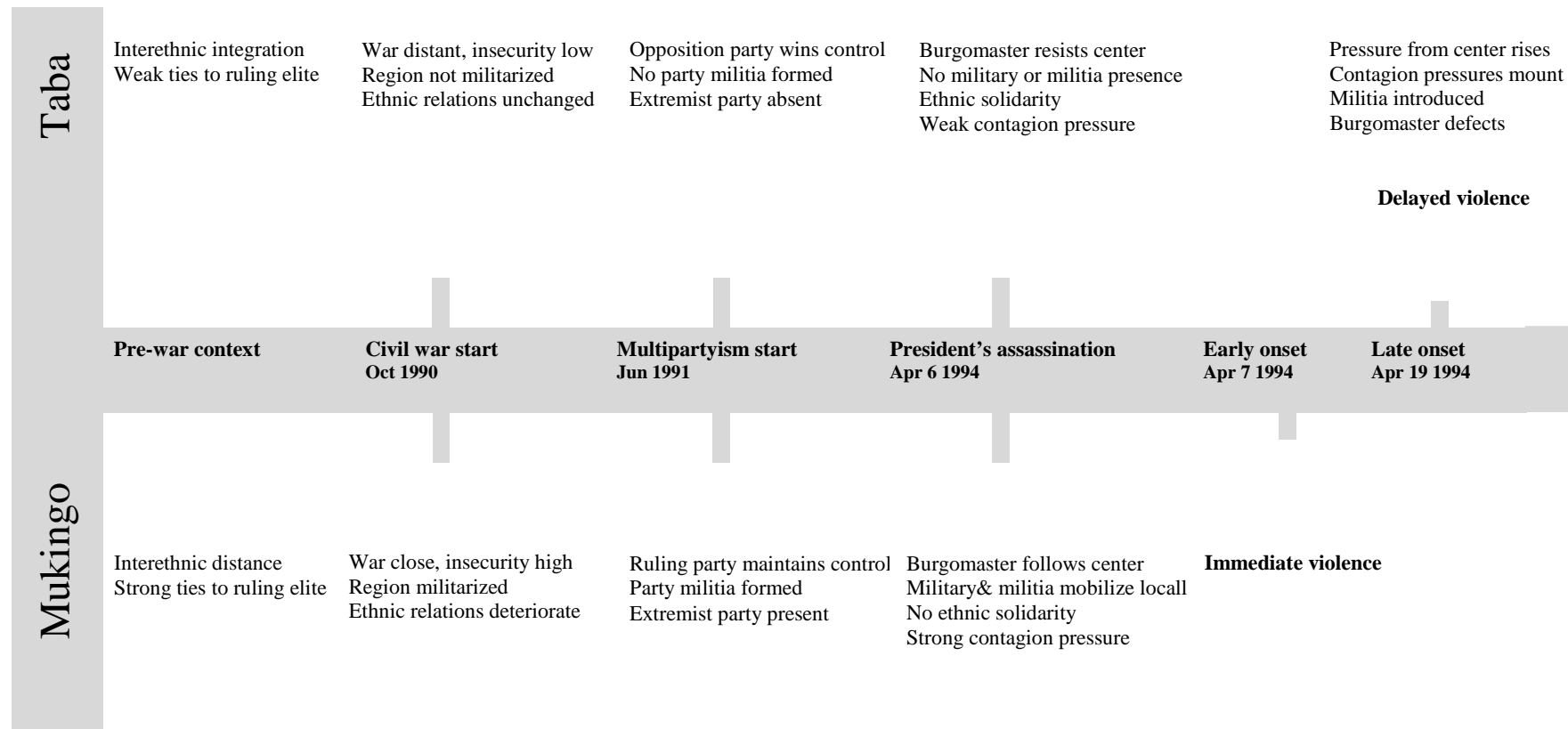
Source: Author's data and compilation.

Figure 1. Onset of Genocidal Violence in Rwanda 1994



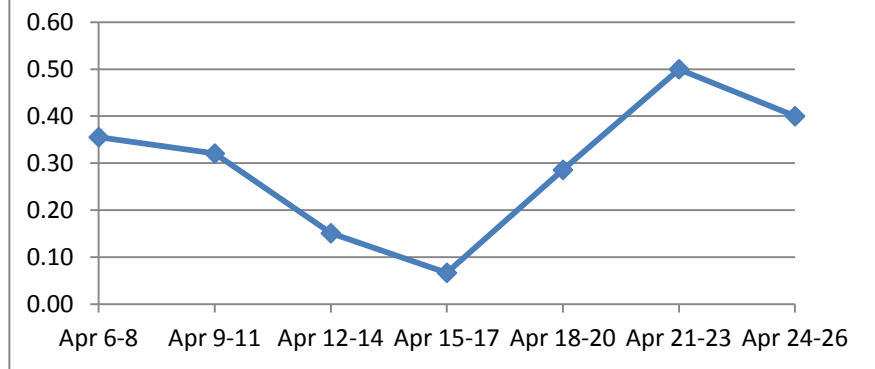
Source: Author's data and compilation.

Figure 2: Tracing process of violence onset in two Rwandan communes



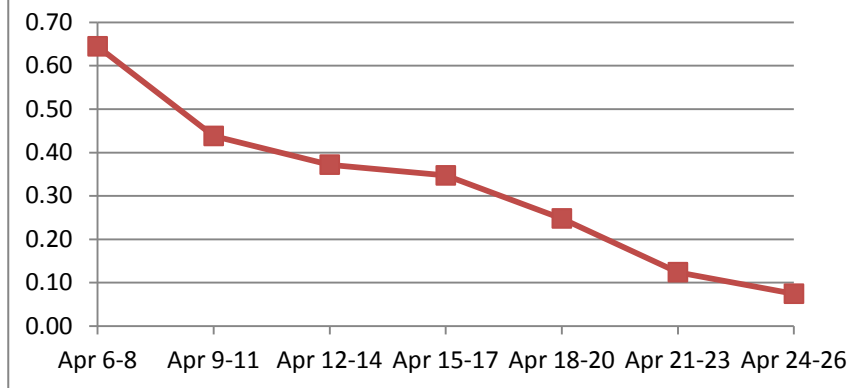
Source: Author's compilation.

**Figure 3. Hazard Function:
Genocide Onset across Rwanda's
Communes**



Source: Author's data and compilation.

**Figure 4. Survivor Function:
Genocidal Onset across Rwanda's
Communes**



Source: Author's data and compilation.