

Local Economic Conditions and Participation in the Rwandan Genocide

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Abstract

This paper uses new data on participation to examine how local economic conditions shaped within-country variation in willingness to participate in violent activities during the Rwandan genocide. It discusses and tests the predictions of three sets of theories about the causes of violence. The data provide strong evidence that higher rates of local unemployment among Hutu are associated with increased participation, and that higher levels of education among Hutu are also associated with higher rates of participation. Contrary to what some theories would predict, I find no evidence that the assets, employment, or education of the Tutsi population reduce participation rates. I also find suggestive evidence of positive associations between violence and the interaction of unemployment and education both at the commune level and at the individual level. These results are robust to the inclusion of province fixed effects and a large set of controls, including radio ownership and the age-profile and migration patterns of the local area. These results are consistent with theories of opportunity costs discouraging violence and violence as political participation, but do not support theories of relative deprivation and looting as causes of violence.

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1 Introduction

The one hundred days in 1994 in which nearly one million Rwandans were brutally killed by their neighbors is widely considered to be one of the most horrific moments of the last century. The enormous number of participants is baffling. This paper contributes to a small but growing literature exploiting subnational variation in participation in conflict in an attempt to make comprehensible such astonishing events.

This paper addresses three sets of theories about participation in violence. These categories, discussed below should be considered *ideal types* acknowledging that the distinctions between them are contrived. While many theories of violence incorporate elements of multiple theories, the distinctions provide a useful framework for discussion. Each of the categories below is defined largely by the predictions that the set of theories would make regarding which characteristics of individuals - and correspondingly, which local economic conditions - would be associated with greater levels of violence.

The first category will be referred to as the *Opportunity Cost* theories. These focus on the low expected value of alternative endeavors on the part of individuals who are choosing to participate in violence. These theories have a strong tradition both in economics, focusing on explicit opportunity costs of engaging in destructive activities, as well as in sociology, focusing on a weakened desire to continue to participate in society with rules that may not be perceived to provide any benefit to the individual. These theories predict that the lower the level of resources held by potential aggressors or the fewer the opportunities he or she has to improve this or her welfare through productive endeavors, the more likely he or she will be to participate in violence. If these theories are true, then increases in employment and education should all be associated with a reduction in participation in violence.

The next set of theories will be referred to as the *Relative wealth and expropriation* theories. These theories, which have often been combined with the first category, focus on

characteristics of those towards whom violence is directed. When potential victims of violence have more, this can generate dissatisfaction with the situation or simply increase the payoff to expropriating their resources. Such theories would predict that if the target of potential violence has either more opportunities that can generate jealousy or greater assets that can be appropriated, there is likely to be more violence observed.

The final set of theories will be referred to as the *Political Participation* theories of violence. These theories are characterized by the argument that violent action may not be simply a destructive abandonment of society and its rules, but may instead be considered a form of political participation that could even be conceived of as pro-social by the one who is engaging in violence¹. These theories have often been proposed in response to observed patterns of participants in violence that were inconsistent with the first two theories, most notably: participation in urban unrest in the United States in the 1960s, and more recently, participation in terrorism. These theories predict that those who are most likely to participate in violence may not be those with the fewest alternatives.

The Rwandan genocide presents both an enormous argument in support of the need to study causes of violence and a potential opportunity to do so. This paper tests the previously mentioned theories using a dataset that combines recently released data on local participation in the genocide and census data collected before the start of the genocide. The data on participation comes from records of the number of individuals accused of crimes associated with genocide, kept by Gacaca tribunals, constructed to prosecute the enormous number of individuals who were still awaiting trial ten years after the genocide. This data is combined, at the local level, with the 1991 census, which contains information on assets, education, employment, a range of demographic characteristics, and ethnic identification.

¹*Les Justes* by Camus may provide the most eloquent example of this

Using this combined data, I find that participation is associated with greater education among Hutu, and lower employment among Hutu, but is not significantly associated with characteristics of the education and employment status of the Tutsi population. This is robust to the inclusion of a large set of controls, including age and migration patterns of the population, radios, and province fixed effects.

The paper proceeds as follows: The next section lays out the theoretical framework, outlining predictions of the theories to be empirically tested, and situates this paper within the broader literature on causes of violence and civil conflict. Section 3 briefly describes the historical context as is relevant to this project. Section 4 outlines the data to be used and section 5 specifies the empirical strategies. Results are presented and discussed in section 6, and section 7 concludes.

2 Theoretical Framework and Literature Review

This section will outline each of the three sets of theories of causes of violence that will later be tested. Each subsection will contain a discussion of the theories, their support and challenges in earlier research, and the predictions the theories would make about who is most likely to participate in violence. The final subsection will discuss related empirical research on violence.

2.1 Opportunity cost theories

The opportunity cost theories posit that those with the least to lose by doing so are the most likely to participate in violence. It is assumed that violence is anti-social and its enactment crowds out productive activities. Thus, holding other factors constant, an individual with a low pay-off to productive work - because of low ability or limited opportunities, for example - is more likely to engage in violence.

This idea is key to models of the individual choice between production and appropriation (Haavelmo, 1954; Grossman and Kim, 1995; Skaperdas, 1992, and Hirshleifer, 1995) and models of crime beginning with Becker's seminal work (1968). In such models, individuals who expect little benefit from production are more likely to expropriate the resources of others or to engage in crime as a means of obtaining the resources that could not otherwise be obtained. A related theory with similar predictions arose in sociology, explaining individual willingness to participate in violence as a step away from a society whose rules do not benefit that individual. Merton (1934) is often attributed with presenting anomie, and the inability to construct well-being through legitimate means, as a cause of deviance.

More recent work has extended rational choice models to explain rebellions, empirically testing whether rebellion could be explained as a response to labor market constraints. Such theories propose that increases in income, education, and economic growth - which increase the opportunity cost of fighting - should reduce the likelihood of rebellion. Collier and Hoeffler (2002) find that at the cross-country level, higher income and higher levels of education are associated with a lower risk of rebellion through an increase in the opportunity cost of violence. They argue that in a society with more education and income, political change can happen through institutional pathways. Similarly, Fearon and Latin (2003) find an association between weak states and political violence, arguing that weak states provide little opportunity to enact political change through non-violent channels, which can also reduce the opportunity cost of violence.

A large number of cross-country studies have found a connection between poor economic conditions and civil conflict, using a range of identification strategies (Collier and Hoeffler, 2004; Fearon and Latin, 2003; Hegre and Sambanis, 2006). These studies rely on national income data and are generally unable to distinguish between variation in resources held by aggressors and victims. Miguel, Satyanath and Sergenti (2004) use rainfall as an instrument for economic growth, which presumably works through agriculture, a likely determinant of

the opportunity cost of fighting among those most likely to fight.

Recent work that uses data on subnational variation in violence has supported this hypothesis that negative shocks to income among potential aggressors facilitate violence (Justino, 2009). Do and Iyer (2010) look at local correlates of violent conflict in Nepal and find that conflict intensity is associated with higher levels of poverty. Murshed and Gates (2005) also look at local-level predictors of violence intensity in Nepal and find that areas with greater landlessness and lower HDI indicators experienced greater levels of violence. Humphreys and Weinstein (2008) find that rebel organizations in Sierra Leone that rely on voluntary recruitment, individuals with limited economic options outside of joining rebel groups are most likely to join.

The theory that opportunity costs reduce willingness to participate in violence rests on the assumption that individuals cannot both work and rebel, and that what they have without rebelling is put at risk if they choose to rebel. For this reason, the time spent in employment may have a stronger deterrent effect than do the wages earned. Dube and Vargas (2009) use variation in international coffee prices and international oil prices to identify different effects of demand shocks in areas in which a labor-intensive industry (coffee) is central and areas dominated by an industry that does not rely on large labor investments (oil). They find that negative shocks to international coffee prices lead to more violence in coffee-producing areas - which is consistent with the opportunity cost theories - and that positive shocks to oil prices lead to more violence in oil-producing regions, which is consistent with the suggestion that resources to finance violence can increase violence, as well as with theories to be discussed below.

While such opportunity cost theories may appear broadly plausible, empirical tests are threatened because motivation for violence is not the only channel through which the resources of potential attackers can influence the likelihood of violence. In particular, even if

more resources may decrease the motivation for violence, more resources, even those held by potential attackers, may also make violence more feasible. Mitra and Ray (2010) design a model in which greater resources on the part of the attacker both reduce the desire for conflict and increase the feasibility of conflict. The prediction of their model is thus inconclusive regarding the sign of the effect of resources held by potential attackers on the likelihood of attacks. Collier, Hoeffler, and Rohner (2009) find that the availability of resources to finance conflict is associated with greater levels of violence. Berman, Felter, and Shapiro (2009) find evidence that is inconsistent with the opportunity cost theory of violence. They show that unemployment in Iraq and the Philippines is not associated with an increase in attacks on government or attacks on civilians. This does not rule out that opportunity costs contribute, but in these contexts, other factors dominate.

In the case of Rwanda, both coffee and tin prices fell dramatically just a few years before the onslaught of violence, and a rapidly growing population increased demand for already limited land for farming. The claim that Rwanda was the victim of a Malthusian crisis in which limited resources made the growing population unsustainable and unstable (Boudreaux, 2009; Diamond, 2005; Yanagizawa, 2006). Soil fertility had “fallen sharply” due to over-cultivation (Percival and Homer-Dixon, 1996). One author writes: “Of the nearly 60 percent of Rwandans under the age of twenty, tens of thousands had little hope of obtaining the land needed to establish their own households or the jobs necessary to provide for a family.” (des Forges, 1999) These factors may have contributed to a reduction in the opportunity cost of violence that facilitated the high rates of participation observed: “Many of these zealous killers were poor, drawn from a population 86 percent of whom lived in poverty, the highest percentage in the world. They included many young men who had hung out on the streets of Kigali or smaller commercial centers, with little prospect of obtaining either the land or the jobs needed to marry and raise families.” (des Forges, 1999). Des Forges (1999) describes the lure of fighting for those with little otherwise: “Authorities offered tangible incentives to

participants. They delivered food, drink, and other intoxicants, parts of military uniforms and small payments in cash to hungry, jobless young men. They encouraged cultivators to pillage farm animals, crops, and such building materials as doors, windows and roofs. Even more important in this land-hungry society, they promised cultivators the fields left vacant by Tutsi victims. To entrepreneurs and members of the local elite, they granted houses, vehicles, control of a small business, or such rare goods as television sets or computers.”

To summarize, the opportunity cost theories posit that resources and opportunities to obtain resources through productive endeavors limit the motivation for violence. If these are true, we will expect to see higher levels of education, employment, and assets on the part of potential attackers associated with lower rates of participation in the genocide.

2.2 Expropriation and relative deprivation theories

The next category of theories deal with the resources held by individuals who are potential victims of violence. These theories suggest that when the potential victim has more resources the likelihood of violence is higher because of either greater dissatisfaction with relative differences in wealth or opportunity, or more directly through a higher expected value of expropriated resources. Such theories are often discussed in combination with ideas from the first set of theories under the umbrella of inequality or relative deprivation theories.

The motivation for expropriation presented by more valuable resources is another key element of classic “guns or butter” models of conflict as a choice between production and appropriation (Haavelmo, 1954; Becker, 1968; Grossman and Kim, 1995; Skaperdas, 1992; Hirshleifer, 1995; Collier and Hoeffler, 2004; Dal Bó and Dal Bó, 2008). In recent work, Mitra and Ray (2010) model inter-group conflict in which one group is predetermined as the aggressor and the other as the victim. Their model predicts that the resources of the victim should unambiguously increase the likelihood of violence between the two groups as violence is at least partially assumed to be undertaken for the purpose of extracting resources from

the victim's group. These theories predict that for purely material reasons, resources held by potential victims increase the likelihood of their being attacked.

Others have focused on the role of the resources held by potential victims in generating dislike among those who have less, even when these resources cannot be appropriated. Relative deprivation theories and theories of the relationship between inequality and conflict argue that when potential victims have more than potential attackers, an increase in the resources held by potential victims can generate violence. Gurr (1970) argues that disappointing comparisons with others in the same society can inspire rebellion. Scott (1977) explains agrarian rebellions through dissatisfaction with growing inequality that did not meet norms of agricultural societies, and Sen (1972) points to inequality as a key driver of rebellions.

There are many studies empirically linking inequality with increased participation in violence, and inequality between the two ethnic groups has been a key element of many narratives of the Rwandan genocide. Many papers have focused on the relationship between income inequality and crime or other types of violence within US cities (Blau and Blau, 1982; Kelly, 2000), within cities elsewhere (Demomboynes and Ozler, 2005; Østby et al, 2009), and between countries (Alesina and Perotti, 1996; Fajnzylber et al, 2002). Inequality has also been linked to civil war and political violence in part through an increase in the material gain of expropriation (Blattman and Miguel, 2010; Dube and Vargas, 2009; Murshed and Gates, 2005).

On the other hand, another set of studies has found no relationship between overall inequality and conflict (Lichbach, 1989; Collier and Hoeffler, 2004; and Fearon and Latin, 2003) and others have argued that the studies that did find significant results rely on weak identification and suffer from problems of endogeneity (Land, McCall, and Cohen, 1990; Soares, 2004). Still others have argued that - rather than overall inequality - between-group

or horizontal inequality may be a more important predictor of civil conflict (Sen, 1992; Tilly, 1999), and some have recently found empirical support for this relationship (Østby, 2008; Cederman, 2010; Wimmer et al, 2009).

In the specific case of the Rwandan genocide, inequality has played a prominent role in many discussions. The story of the poor and downtrodden Hutu peasants overthrowing their royal Tutsi oppressors has been a standard part of the Rwandan story, or what some would call a myth, since long before the 1959 revolution in which Hutu took control of the government away from the long-standing Tutsi rulers, and it has continued to come up as a key part of the story of the genocide (Mamdani, 2002; Prunier, 1995, Straus, 2006). The popular press generally mentions the Belgian elevation of the Tutsi as superior and the subsequent belittling of the Hutu when discussing the genocide. Specific accounts rarely fail to mention both the possibility of looting and the existence of jealousy between groups to explain what happened in 1994 (Cramer, 2003; des Forges, 1999; Gourevitch, 1999; Hatzfeld, 2005; Hatzfeld, 2007; Mamdani, 2002; Prunier, 1995; Straus, 2006). Still, many caution that the purely material motivation of taking Tutsi property was likely to have been minimal (des Forges 1999; Prunier, 1995; Straus, 2006).

Regarding jealousy, Prunier (1995) writes: “Political power had been in Hutu hands for thirty-five years but, thanks to the Belgian social and educational favouritism towards the Tutsi for the forty years before that, the Tutsi community was still able to do well for itself socially and economically. This did not only mean the big Tutsi businessmen; it also meant that most of the local personnel in foreign embassies and in NGOs and international agencies were Tutsi, that there were many Tutsi in the professions and even that the best and highest-priced bar girls, the ones to be encountered in the big hotels, were Tutsi. Social envy came together with political hatred to fire the Interahamwe bloodlust.”

Regarding the possibility of looting, “There was of course also an element of material interest in the killings, even in the countryside. The killers looted household belongings and slaughtered the cattle. Meat became very cheap, and grand feasts were held, as if in celebration of the massacre. ... Villagers also probably had a vague hope that if things settled down after the massacres they could obtain pieces of land belonging to the victims, a strong lure in such a land-starved country as Rwanda.” (Prunier, 1995) Des Forges corroborates the description of the incentive of what could be obtained: “The killing campaign created new opportunities for getting rich as Tutsi property became available for appropriation and it generated new possibilities for acquiring power as political alliances shifted.” (des Forges, 1999).

This class of theories predict that, holding other factors constant, an increase in the resources held by potential victims is likely to be associated with higher participation rates.

2.3 Political Participation and Unmet Expectations

The final set of theories conceive of violence as a form of political action and acknowledge that education can generate dissatisfaction. In response to dissatisfaction, individuals may respond violently in order to change the distribution of power. These theories do not dispute the above theories, but rather propose additional - and sometimes complementary - ways in which the distribution of resources between individuals can generate conflict, sometimes leading to different empirical predictions. Theories of violence as political participation typically rely on the presence of dissatisfaction and it is important to note that this dissatisfaction can be generated in part by poverty and relative deprivation. In many cases, these theories of violence as a form of political participation arose in order to explain characteristics of individuals or groups undertaking violence that did not fit the predictions of the previous models.

A common theme of stories of violence as political participation is that individuals who have reason to hope for good economic outcomes - either through investments in education or through rapid political, social, or economic advancement - are confronted with disappointing available options - high unemployment, high poverty, or continued discrimination or political repression. One early example of this was the case of urban civil unrest in the United States during the 1960s. Previous theories had predicted that those involved in civil unrest would be the least well-off and the most-marginalized. Yet high levels of participation among well-educated and well-connected individuals called these theories into question, spawning a broad literature in sociology and political science in which researchers attempted to produce new theories to explain the surprising make-up of the participants (Mason and Murtagh, 1985; Sears and McConahay, 1969). The J-Curve theory (Davies, 1974; Miller et al, 1977) was a popular version of the theory that unmet expectations contributed to increased participation in violence among those who were not least well off. The theory proposed that rapid progress followed by a decline leads people to revolt. Progress raised expectations and the decline crushed them. Gurr (1970) proposed similar explanations for rebellions more generally, arguing that unmet expectations could generate a feeling of disappointment relative to what was anticipated, leading to violence. In these conceptions, when realized welfare outcomes are more beneficial for individuals, this may reduce conflict, but when expected outcomes are higher, this could increase conflict. In particular, more education may increase expectations, and - in the absence of available employment - may lead to violence.

More recently, similar theories have been generated to explain a related and also surprising observation made about terrorism: those who belong to terrorist organizations and even those who participate in suicide bombings are often not the least educated or most marginalized. Krueger and Maleckova (2003) find that poverty and low education do not predict individual participation in terrorism. Berrebi (2007) finds that high education and income are both positively associated with participation in terrorist organization. Abadie (2006) finds that

poverty does not predict cross-country levels of terrorism, but that political dissatisfaction does matter. These all present strong evidence of a stylized fact: although most models of violence or crime predict that all forms of marginalization will lead to increased participation in violence, there are many instances in which those who participate are far from the least well-off.

These correlations between increased education and participation in terrorist groups are threatened by the presence of selection. If terrorist groups only allow those who are more capable to join, then the observed patterns of membership could reflect choices made by the organization rather than the individual. Recent work has focused on disentangling selection and motivation (Bueno de Mesquita, 2005). In the case of the Rwandan genocide, selection is not an issue because there was very little or no selection: radios broadcast invitations to all to join and the tools used were those available to farmers, rather than scarce or difficult to use modern weapons.

In Rwanda, education - which had once been mostly a privilege of the ruling Tutsi - had been increasing dramatically among Hutu since Hutu leadership had taken control of the government in 1959 (Prunier, 1995). Economic growth was also relatively high in the 1970s, “but the prosperity was both fragile and superficial. The mass of the people stayed poor and faced the prospect of getting only poorer.” (des Forges, 1999). These initial advances may have increased expectations which were disappointed.

This set of theories propose that higher levels of education among potential aggressors may in some cases be associated with greater levels of violence.

2.4 Literature on Violence and Civil Unrest in Rwanda

This paper can also be situated within a small literature in economics explaining participation in the Rwandan genocide. The empirical literature on the economics of violent

conflict in the world is notably lacking in micro-studies to understand individual motivations for participation in violence (Blattman, Miguel, 2009), and Rwanda is no exception. While there are many accounts of the genocide outside of economics and empirical political science, economists have rarely participated in the generation of explanations for the level of participation in the Rwandan genocide, with a few notable exceptions.

Verwimp (2004) used a database of survivors and victims from a single prefecture (Kibuye) to identify individual predictors of survival, including age, sex, occupation, and actions taken after the start of the genocide. Justino and Verwimp (2007) also find high excess mortality among the wealthiest regions in Rwanda. In a separate paper, Verwimp (2005) constructs a panel of data for 350 households interviewed before and after the genocide and finds that individuals with higher off-farm income and those from households with higher incomes were more likely to participate in the genocide. This is partially in contrast with the conclusions of Andre and Platteau (1998) who focus on characteristics of victims. They find that those with greater land-holdings, as well as those who are considered trouble-makers, are more likely to be victims, and they conclude that the genocide was a time for the settling of scores and the undertaking of land grabs. The different findings of the two studies may be partly explained by the limits of the data of Andre and Platteau, whose study included only Hutu households. Verwimp (2005) also does find that the percent of land that a household rents is positively associated with the likelihood of participation. De Walque and Verwimp (2010) use the 2000 Demographic and Health Survey to estimate excess mortality and thus correlates with the likelihood of dying during the genocide. They find that those in urban areas and with more educated backgrounds were more likely to be killed. They do not look at characteristics of the killers but contributes to the story about motivations for killing. Yanagizawa (2009) recently took advantage of the newly released Gacaca data (described below) and the presence of mountains that can block radio signals to look at the impact of exposure to hate radio on participation rates and found large impacts. This followed an

earlier paper that used more limited data and found a smaller - almost negligible - effect of exposure to radio on participation (Straus, 2005).

There are many extremely important debates about causes of civil conflict and the nature of the genocide in Rwanda that this paper does not address. For example, this paper will not touch on debates about whether violence fits the pattern of a genocide or of politicide. It will take ethnic identity as pre-determined and reasonably stable. Details of recruitment methods and internal organization of fighters or the psychological factors that allow for mass violence to occur will not be addressed. It will provide empirical tests of the predictions of three models of the relationship between resources and participation in civil conflict using data from the Rwandan genocide of 1994.

3 Historical Context

Many key facts about the genocide are debated, from the number of people killed to who shot down the president's plane that set off the start of the massacres. Here I will attempt to very briefly summarize the key events that are necessary to provide background for this study. More detailed accounts can be found in des Forges (1999), Gourevitch (1999), Mamdani (2001), and Prunier (1995).

At the time of independence from France, the Rwandan population was almost entirely comprised of two ethnic groups, the Tutsi and the Hutu. The nature of the distinction between these two groups before colonization is heatedly debated. Early accounts argued that pastoralist Tutsi were the descendents of Hamitic migrants coming from either Egypt or Ethiopia and that the Hutu were agriculturalist Bantu who had lived in the area for much longer. Others have since argued that the physical differences in height and facial features between the two groups noticed by the colonizers were simply the result of different diets - one rich in milk and the other relying exclusively on agricultural produce - and that

the two groups shared a common ancestry. There seems to be universal agreement that the Belgian colonizers at least accentuated and hardened these differences by identifying the Tutsi as a superior race of outsiders born to rule over the Hutu peasants. Although some have argued that the differences between the ethnic groups were small before the genocide, despite having a common language (Kinyarwanda), a common religion (Christianity), and common neighborhoods (the proportion of Tutsi in a commune is never more than forty percent), the intermarriage rate was low before the genocide 28.6 percent of Tutsi were married to Hutu and 2.5 percent of Hutu were married to Tutsi and it had not increased in a generation. Of those in the census, 26.8 percent of Tutsi parents were married to Hutu and 2.4 percent of Hutu parents were married to Tutsi. ²

In 1959, Tutsi leadership was overthrown in a “democratic” revolution that installed a Hutu government. After this and later small massacres, many Tutsi began living in exile in Burundi, Uganda, and Zaire/the Democratic Republic of the Congo. Some of these exiles formed the Rwandan Patriotic Front in Uganda in 1987, which agitated, along with Tutsi within Rwanda, for representation in the government. At the same time, many other opposition parties within Rwanda began to fracture with some branches supporting “Hutu Power.” In 1993 an agreement in Arusha was reached to incorporate opposition parties and the RPF into the Rwandan government, but the existing government, led by President Juvenal Habyarimana, was slow to implement the accords.

On April 6, 1994, Juvenal Habyarimana boarded a plane to Kigali with the President of Burundi, coming from a meeting with other East African leaders to encourage the President to implement the protocols from the Arusha accords which outlined the construction of a new government that would incorporate the RPF leadership and representatives from other opposition political parties. Immediately before landing in Kigali, the plane was shot down

²The difference between the intermarriage rates for those of each group comes from the different sizes of the populations of each ethnic group within the country.

and landed in the president's compound.

That evening, killings of Tutsi and moderate Hutu leaders began and massacres of Tutsi and moderate Hutu quickly began across the country, lasting for 100 days. Estimates of the number killed range from 500,000 to more than 1 million.³ Estimates of the number of participants in the violence are similar or even larger, with the majority of the killings having been committed with machetes and clubs.

Those accused of the highest levels of crimes - organization of massacres - are being tried in the International Criminal Tribunal for Rwanda in Arusha, Tanzania. However, those accused of lower level crimes - including killing and smaller-scale organizing - are tried in local courts, known as Gacaca tribunals, which are based on a traditional system of justice in Rwanda. These courts are set up at the sector level and involve those who are prosecuted confessing their crimes to the community. These tribunals keep very detailed records, and it is the numbers of accused in each sector that provide the basis for this analysis.

4 Data

The data is taken primarily from two sources. First, participation rates come from records produced by local-level tribunals, or Gacaca courts. These records give the number of individuals accused of committing each of three levels of crimes during the genocide in each sector (village). Three other primary sources of data at different geographical levels or for smaller numbers of sectors are used to test the validity of this data. Second, pre-genocide education, assets, and employment information is taken from the 1991 census in Rwanda, available through IPUMS International.

³The Government of Rwanda generally uses 1.2 million and most major international media outlets (including Al Jazeera, BBC, New York Times, Time Magazine, the Times (of South Africa)) use 800,000.

4.1 Participation rates

I will use the number of people accused by Gacaca courts in a sector as a proxy for the number of people who participated in the genocide in that sector. These decentralized courts were established, based on a traditional system of participative justice, in order to expedite the process of trying the enormous number of people accused of committing acts of genocide who were still awaiting trial years later. In 2005, at the local level, detailed lists were constructed of those to be prosecuted. The accused can be prosecuted for one of three categories⁴ defined by the Government of Rwanda below.

1st category: 77,420 total, 0-1145 per sector

- Planners, organisers, instigators, supervisors of the genocide
- Leaders at the national, provincial or district level, within political parties, army, religious denominations or militia;
- The well-known murderer who distinguished himself because of the zeal which characterised him in the killings or the excessive wickedness with which killings were carried out.
- People who committed rape or acts of sexual torture.

2nd category: 430,552 total, 0-2807 per sector:

- Authors, co-authors, accomplices of deliberate homicides, or of serious attacks that caused someones death.
- The person who - with intention of killing - caused injuries or committed other serious violence, but without actually causing death.

⁴A previous categorization scheme contained four levels of crimes, splitting the second category into two separate levels of crimes.

- The person who committed criminal acts or became accomplice of serious attacks, without the intention of causing death.

3rd category: 309, 645 total, 0-1919 per sector:

- The person having committed offenses against property.

Those accused of the highest level of crimes are tried by the International Criminal Tribunal for Rwanda (ICTR) in Arusha. The rest are tried by Gacaca courts. The data released is the number of individuals accused of each of the three lower levels of crimes, in each of the 1513 sectors, who are still alive and living in Rwanda.

This is obviously an imperfect measure of the actual participation rate, but one that can be shown to be valid through three methods. First, I show that it is correlated with other measures of participation and measures of conflict intensity in fewer communes or at higher levels of aggregation. Second, a more detailed validation of this data has been undertaken by Verpoorten (2010), and this exercise includes a correction for survival bias using the distance from the sector to a mass grave.⁵ Finally, I will directly address possible biases.

Validation from other sources:

The first source of victim counts comes from a 1996 report from the Ministry of Higher Education, Scientific Research, and Culture. This report includes estimates of the numbers killed in most communes in Rwanda, with the exception of those in Kibuye Prefecture. Table 1 presents these estimates of the number of victims next to the Gacaca data. The number of killers per victim can vary greatly and thus we do not expect these numbers to match perfectly or to maintain a perfectly consistent ratio, even in the absence of measurement error.

⁵I have been in touch with the author and while she has graciously shared with me a few columns of her data that helped me to link between my two datasets, I am waiting for the official release of her validated and corrected version of the Gacaca data.

The second source of data is from the PRIO/Uppsala data on violent conflicts. This uses media and other reports to track the locations of armed conflicts. This data is presented as the number of incidents rather than the number of victims, and it is recorded at the province level. Table 2 presents the number of incidents recorded by PRIO next to the number of perpetrators recorded in the Gacaca data for each prefecture. One notable difference is that Kigali has a large number of incidents in the PRIO data but a smaller number of perpetrators. This is likely because the reliance on media reports over-reports incidents in the capital city relative to outlying areas.

The third dataset also reports violence at the prefecture level. Christian Davenport and Allan Stam have compiled a database of timing and lethality of conflict by day and by prefecture using five primary sources: eyewitness testimony recorded by African Rights in their publication, *Rwanda: Death, Despair, and Defiance, Leave None to Tell the Story* by Alison des Forges and Human Rights Watch, the data produced by IBUKA mentioned above, records of eyewitness testimony from the International Criminal Tribunal on Rwanda, and reports from the Ministries of Education and of Youth, Culture and Sports. Aggregating this by prefecture, Table 3 presents these totals next to those from the Gacaca data. Table 4 presents the correlations between each of these data sources and the Gacaca data.

Finally, it is important to address some of the strengths and weaknesses of the Gacaca data. The detailed and disaggregated nature of the data provide obvious benefits. Another strength, specific to this project, is that this data provides the number of perpetrators, rather than other measures of conflict intensity. While data on the number of deaths or survivors is important in measuring the impacts of variation in the intensity of violent conflict, the number of individuals who are involved really is the ideal outcome measure in a study that tries to understand the motivations of the participants. One related limitation is that a fuller understanding of the decisions of those who participated in the violence would require a count of the number of victims for each participant. Still, while the different motivations

necessary for an individual to participate in more violence once (s)he has begun, my primary interest in this project is to uncover what led so many individuals to make the first choice to participate at all.

Still the data has limits. The most important is that it is not a measure of those who participated but a measure of those who are being prosecuted. There are a few ways in which these numbers could differ. For an individual to be included on these lists, somebody else in the area must have publicly claimed that he or she participated in the genocide. First, it is possible, and there are allegations of specific instances, that these accusations can be used politically or to settle old scores, and false accusations can be made. Conversely, it is very possible that many who participated were never accused, perhaps because all of the witnesses and friends and relatives of those they killed are not around to tell the story or are afraid to speak up. This bias is likely to be stronger than the first and thus we would expect that in areas where there are fewer survivors, the number of accusations may be differentially lower than the number of participants. Still, the Gacaca courts have been very thorough in investigating, and reports of those afraid to speak are rare, so this data is likely to be a good proxy for the number of participants in each area. Specific concerns will be addressed in the analysis.

I aggregate these sector-level participation numbers to the level of a commune and combine them with the population by commune from the 1991 census. The population numbers are likely to be a very good measure of the 1994 population. This is because 1991 is only three years earlier so population change from births is likely consistent across regions and also largely irrelevant because the new additions would be too young to participate. Mobility, the other source of population change, within the country was limited, requiring official approval to change residences (Prunier, 1995), and heavy restrictions on buying and selling land

(Andre and Platteau, 1996). One possible alternative measure would be to use the population of adult men as the denominator, instead of the entire population, since perpetrators were nearly exclusively from this group. This, however, would require choosing an appropriate cut-off for ages and ignoring the small number of women who did participate, particularly at lower levels of crimes. Using the entire population reduces any threat of bias from the researcher choosing the cut-off. I will repeat the analysis using men age 18-50 as the denominator to be sure that the results do not qualitatively change. Figure 2 presents the observed variation in participation rates across communes.

4.2 Baseline local economic conditions

These are constructed using the 1991 Census available through IPUMS International.

Ethnicity: The 1991 Census includes a variable for ethnicity. Before the genocide, all citizens were required to carry an identity card in which his or her ethnicity was clearly marked. In general, children of mixed marriages took the ethnicity of their father, but there are a few exceptions to this rule that show up in the Census (less than five percent of those whose parents are of different ethnicities). I limit the sample to only those who are either Hutu or Tutsi. The remainder of the observations in the Census includes the approximately 1percent of the population that is Twa, naturalized Rwandans from other origins, and foreigners living in the country. Ignoring the others does not significantly change population numbers.

Human Capital: The human capital variable is presented as a score based on self-reports of the highest level of education completed. The codes for values of this variable were unavailable at higher levels. The lower numbers are coded to represent years of primary school and then years of secondary school, but values of the higher codes were hidden. This means that if these numbers were to be translated into years of schooling, then those with the most education would be dropped from the analysis. Therefore, the codes themselves

are included directly as a human capital score. This is imperfect but does appear to reflect increases in human capital. Figure 1 presents a plot of the mean assets held by individuals with each human capital score. Assets are clearly increasing with this human capital score, which helps to validate the use of this measure of education.

Employment: In an agricultural setting, virtually nobody reports being unemployed as those without formal sector jobs work on farms. For a measure of formal sector employment, I construct a binary variable that is one if the person reports that they are an employee or an employer, and 0 if he or she reports being unemployed or self-employed. Using this, I construct a measure of the percent of Hutu employed and the percent of Tutsi employed in the formal sector. This is similar to other measures of “off-farm income” used in the literature.

Density: The census separately reports the area of each commune, which I use with the raw data to construct the population density.

Proportion Hutu: I construct a variable to represent the proportion of the population in a commune that is Hutu. In a country with two ethnic groups and enough tension between them to facilitate such a bloody history, the two ethnic groups are surprisingly dispersed which generates a proportion Hutu that ranges from 0.65 to 0.99. One explanation for the dispersion of Tutsi is that animal-keeping, the historical occupation of many Tutsi, is an offshoot of agriculturalist societies and depends on proximity to agriculturalists for nutrients. While animals provide milk, and occasionally meat, most herding societies use these products to trade for a dominant portion of their calories. Regardless of the origin, the current ratio of the ethnic groups can change the incentives of potential participants. As the proportion Tutsi increases, the potential reward of expropriation increases. However, if

it gets high enough, the likelihood of success declines. Thus we expect, and find, that the highest level of participation comes when there are sufficient Tutsi for participation to be profitable. It should be noted that this relationship may be somewhat mechanical as one would expect there to be low participation when there is simply nobody to attack. Figure 3 plots participation rates as a function of the proportion of the population that is Hutu.

Young men: Participants in violent conflict are often young men. Young men are also likely to be relatively more educated with relatively fewer assets when compared with their elders. Thus if there is variation in the age distribution in communes, this could be an important omitted variable. We may also expect that different populations due to temporary migration may have different impacts on participation rates. I construct four variables to control for their presence: 1) The proportion of the population that is between 18 and 30, 2) The proportion of the population that is male, 3) the proportion of the population currently in the commune which was born elsewhere, and 4) the proportion of the population that was born in the commune that currently lives somewhere else.

There may be reason to think that the young male population was not as important in this conflict as in others. Based on first-hand accounts, all men were asked to participate, and where there were high levels of participation, men of all ages joined the ranks. Figure 4 presents the age distribution in Kibuye Prefecture of those in the Census and the victims. While we would not expect the age distribution of those who participated to match that of the victims, the similarities in the distribution may still support a claim that this war was not one simply between young men. Also, there are many accounts in which women participated. They were not generally taking part in killing squads, but they were often responsible for looting and were sometimes credited with encouraging their male relatives (Hatzfeld, 2005; Hatzfeld, 2007).

Radio: Recent research has convincingly shown that the presence of radios contributed enormously to the number of participants in the genocide as propaganda on the radio coordinated individuals (Yanagizawa, 2010). As radio-ownership may be associated with education and resources, it is included as a control variable. The census asks individuals whether their household owns a radio and the commune-level variable is the percent of Hutu and the percent of Tutsi who own a radio. These are included separately since radio ownership among Hutu is what has been previously associated with violence.

Table 5 presents a selection of summary statistics, split by ethnicity.

4.3 Combining data

The administrative boundaries in Rwanda have shifted multiple times since the 1991 census, which means that matching the two data sources is not perfectly straight-forward. Gacaca records are reported by current prefecture and district, and by the pre-2005 sector. Census records are reported by province and commune, and limited information about population is presented with the sector. The analysis requires the use of information only available in the census at the commune level, and thus the sectors in the Gacaca records need to be matched with their former communes. The sectors correspond reasonably well, but different spellings and multiple sectors in different parts of the country with the same name complicate the process. The method used took two stages. In the first stage, sectors were matched automatically based on names and, in the absence of evidence to the contrary, a sector in one data set with a single correspondingly named sector in the second dataset was considered matched. In the second stage, the set of sectors that shared names in either dataset or that did not match a name in the other dataset were matched by hand. This involved using 1) the locations of the previous eleven provinces and the current four prefectures, 2) records from ICTR cases in which home sectors and communes of the accused were listed, and 3) any other mentions of the sector and commune and province available on the

Internet. In the end, nearly 95 percent of sectors were matched. In cases in which sectors were not matched, I assume the participation rate in the unmatched sectors is equivalent to that in the matched sectors within the same commune.

5 Empirical Strategy

The general form of the estimating equation will be as follows:

$$PartRate_j = a + b_1 * EmploymentTutsi_j + b_2 * EmploymentHutu_j + b_3 * HcTutsi_j + b_4 * HcHutu_j + b_{ij} * X_{ij} + e_j$$

where $PartRate_j$ is the participation rate measured by the number prosecuted divided by the Hutu population in a commune. The variable $EmploymentTutsi_j$ represents the percent of Tutsi who are formally employed, while $HcTutsi_j$ represents the mean education score for individuals in commune j. Finally, X_{ij} is a vector of controls.

If the *opportunity cost* theories are true, then we would expect the following:

- b_2 and b_4 are negative.

If the *relative deprivation and expropriation* theories are true, then we would expect:

- b_1 and b_3 are positive.

Finally, if the theories of violence as *political participation* are true, then:

- b_4 may be positive.

Due to data constraints, I estimate all equations at the commune level, with 145 communes. A few variables are available at the sector level, including participation. It would be possible to use the sector as the unit analysis and cluster the standard errors at the level of the commune, but as the key independent variables are not available at the level of the sector, this would not change the statistical power. All equations are estimated controlling for density, the proportion Hutu, and the square of the proportion Hutu, the population of the commune, and province fixed effects for each of the 11 provinces.⁶ In one specification, I include a commune-level mean asset-score for each ethnicity to broaden the story about employment. I also present estimates that control for the proportion of the population that is young and the proportion of the population that is male, as well as for the proportion that immigrated and that emigrated, the presence of radios among each ethnic group, and with all controls in the same specification.

In all specifications, I aggregate the individual data by using the mean of the individual variables within a commune, while perhaps other statistics would be more relevant. All estimates are also attempted using the median, and the results (not shown) are not qualitatively different. Each commune carries the same weight in all estimations. Weighting by the overall population does not qualitatively change the results. The participation data is available split by the three categories of crimes, described above. The first two categories include organization and clearly violent action. The third category can include less violent crimes such as looting and other property crimes. Results are presented pooling the crimes, then split between the first two categories and the third category.

⁶There are now only 5 provinces, but there were 11 at the time of the genocide in 1994 and in 1991 when the census was collected.

6 Results and Discussion

6.1 Estimates

Table 6 presents estimates using the overall participation rate as a percentage (0 to 100) as the dependent variable. All estimates include controls for the population of the commune, the proportion of the population that is Hutu, and the square of this, as well as the population density, and a full set of province fixed effects. Column 1 contains the basic specification with only these controls and education and employment for each ethnic group. The coefficient on Hutu education is positive and significant. The standard deviation of mean human capital scores at the commune level is 1.9, so a one standard deviation increase in the communes level of education is associated with an increase in the participation rate of 2.5 percentage points. The mean participation rate is 14 percent and the average Hutu population in a commune is approximately 45,000, so this represents an increase in participation of 18 percent or approximately 1125 participants per commune. The coefficient on Hutu employment is -44.09, which is significant at the 1 percent level. Here a one standard deviation change in the commune's employment rate would generate a reduction in the participation rate of 4 percentage points, a change of 29 percent and approximately 1800 participants per commune. The coefficients for human capital and employment for Tutsi are both small and insignificant.

Column 2 controls for the population that is young and the proportion of the population that is male. One concern is that young people have higher education, lower assets, and a higher propensity to participate in violence and thus their presence could independently generate similar correlations. Neither of these is statistically significant, but the estimates are sufficiently imprecise that it is not possible to rule out some meaningful relationship with the participation rate. Interestingly, their inclusion does not substantially change the strong and statistically significant coefficients on Hutu human capital and employment. The third column controls for the proportion of the population that was born elsewhere and

the proportion born there which had emigrated from the commune. Neither of these is statistically significant and their inclusion also does not change the strength of the previously identified coefficients. The fourth column includes controls for radio ownership among each ethnic group and again, the main results do not change. The final column includes all controls, and again, the results remain stable.

This shows consistent estimates of the relationship between the participate-rate and Hutu education and employment. The coefficients on Tutsi human capital and employment are consistently of small magnitude and not statistically significant.

Tables 7 and 8 present the same estimates but split between types of crime. The participation rates used as the independent variable in table 7 include only crimes in categories 1 and 2, which are necessarily violent, and Table 8 includes crimes that may have only dealt with property. Because the participation rate is the sum of these two types of crimes, the coefficients in Tables 7 and 8 sum to give the coefficients in Table 6, thus they are necessarily of smaller magnitude. The first two categories make up 62 percent of the total number of participants. The results in these two tables appear quite similar. One interpretation of the similarity is that the same motivations generate the two types of crimes. Alternatively, the two types of crimes were very correlated within the genocide and more violence may have made more property crime possible.

6.2 Discussion

6.2.1 Opportunity Costs

Opportunity cost theories predict that communes in which potential aggressors had the greatest level of available resources outside of conflict would be the least likely to have high participation rates. The consistently large negative coefficient on Hutu employment fits very well with this theory. However, the coefficients on Hutu assets are positive, although

largely insignificant, as are the coefficients on education. These findings may then provide support for other theories to be discussed below. The difference between the role of assets and employment may lend support to the idea that employment does not just provide a high yield alternative to fighting, but that its maintenance (unlike education and assets) necessarily depends on not fighting. On the other hand, formal sector employment largely collapsed during the genocide and thus this may not be a likely explanation.

6.2.2 Expropriation and Relative deprivation

Expropriation and relative deprivation theories predict that the more resources that are held by potential victims of an attack, the more likely that attack is to occur. In this case, these would predict that communes with high levels of assets, employment, and education among Tutsi would see the highest levels of violence. In tables 6, 7, and 8, these relationships are all consistently insignificantly different from zero.

Another threat to the interpretation of the coefficients on Tutsi resources is classical measurement error. In some communes, the number of Tutsi households is low enough that the mean levels are estimated by aggregating over a small number of observations. This means that the imprecise estimate of the local level of assets, especially in areas with small Tutsi populations, could generate classical measurement error in the independent variable and resulting attenuation bias in the coefficients. To check whether this is the case, I used an instrumental variables specification to reduce measurement error. This was done by splitting the sample of Tutsi households in half in each commune and using the estimated mean in one half as an instrument for the mean in the other half. These estimates, which are not presented, provide similarly insignificant coefficients on Tutsi assets and human capital.

This paper then does not provide evidence in favor of the theories of looting and relative deprivation generating violence. Partly because of the threat of measurement error, it also cannot conclusively say that these factors have no effect.

6.2.3 Political participation and unmet expectations

The unique prediction of the theories of violence as political participation was that education among potential aggressors can increase the likelihood of violence. With a robust significant positive estimate of the relationship between Hutu education and participation, this paper provides evidence that is consistent with these theories.

Previous studies that have found a link between education and violence are often threatened by selection into violence. Terrorist organizations may choose the most educated members or those who have the most education within an area may find themselves leading action, even if their support for it is not greater than those they lead. In the Rwandan case, these threats are not such worries. First, everybody was encouraged to participate and thus selection is much less of a concern than in any context in which fighters are screened by the organization for which they are fighting. Second, this study relies on the aggregation of individual observations to the level of the commune, which can complicate the findings of some results, but in this case, it may strengthen them. The findings do not imply that those who are the most educated within their areas are the most likely to fight, but that in those areas where many are educated, some individuals are more likely to fight.

6.3 Further analysis

Many of the theories that predict a positive association between education and violence include a link with unemployment or other factors that lead to dissatisfaction. If this is true, then one should expect that education and unemployment do not act separately to influence violence but instead interact. To test whether this is true, I interact the two using

two different methods.

In the first specification, the two variables are interacted at the local level. Unemployment is used instead of employment for ease of interpretation of the coefficients. This is defined as one minus the employment rate previously used. Then both this variable and the variable for Hutu education are normalized to have a mean of zero and a standard deviation of one. This is done so that the un-interacted terms can be interpreted as the effect at the mean of a change of one standard deviation. Then the usual specifications are repeated including the normalized unemployment and education variables and the interaction between the two. If education and unemployment combine to generate greater violence, then one expects a positive coefficient on the interaction term. This is presented in Table 11.

The coefficients on the un-interacted terms are still strong and significant in the same directions as before. The interaction term has a positive coefficient, which is only statistically significant in two of the five models. Still the magnitude of the coefficients is large. If we choose the coefficient from column 5, the coefficient is 0.665, which means that a one standard deviation increase in education increases the impact of unemployment on participation by 0.665 percentage points or 292 individuals.

The second specification looks at differences in education levels of individuals by employment status. Although the data must be aggregated to the level of the commune, the rich census data allows for the inclusion of many more statistics, beyond simple means. In this specification, the mean education among Hutu is included separated for those who are formally employed and those who are not formally employed. This is presented in Table 12. Based on the coefficients, the predictive power is largely driven by the mean education of those who are unemployed, rather than those with formal-sector employment. An F-test of the difference between these two coefficients is provided in each column. The differences are nearly significant at the ten percent level, but not quite.

6.3.1 Caveats

This paper provides evidence that is consistent with models of violence as political participation and with opportunity costs reducing participation, but is not consistent with theories of relative deprivation and looting as key determinants of violence. A few caveats must be presented along with these findings.

First, this is only one case. Cramer (2003) pointed out that in the case of inequality in violence, one important explanation for variation in findings across conflicts or inconclusive cross-national results is that the causes of violence are extremely complex and that patterns that do exist may be stronger or weaker in different contexts. Still, a study of the variation in violence at the sub-national level contributes to a growing story about causes of conflict broadly. This case is also particularly interesting and broadly relevant. In only 100 days, nearly one million individuals were killed, mostly with tools used in farming. A similar number of people participated in this violence. The incredible magnitude of this cannot be ignored and it has understandably piqued the interest of a broad range of scholars attempting to understand or come to terms with it. Its applicability may also come from the scope and the nature of the participants. Very few or no other conflicts involved as many (partially) voluntary participants and thus this provides an obvious case in which to investigate causes of individual participation.

Second, the power is limited by the number of localities and the purely cross-sectional nature of the data. Thus, while we cannot reject a null hypothesis that Tutsi employment or human capital had no effect, the size of the confidence intervals also means that we cannot reject some moderately substantial effects either. The third caveat deals with measurement error. Although some attempts have been made to deal with this, classical measurement error may still bias coefficients - especially on less precisely estimated levels of employment and human capital among the smaller number of Tutsi present in the census - towards zero.

There may also be measurement error present due to misidentification of local areas because of inappropriately matched observations and because of the use of proxies when precise assets were not available and there is no information on income.

The aggregation to the level of the commune means that nothing can be definitively said about the nature of individual motivations. This means that no theories that make predictions about correlates of violence that do not vary across local levels can be tested. This also means that the reader is asked to believe the assumption that the associations observed between commune-level means of participation and characteristics of individuals reflect individual variation in willingness to participate. For example, this data does not provide the ability to disentangle the effect of being educated and knowing more people who are educated. Still, with limited data available, these results can provide suggestive evidence of factors that contribute to variation in participation in violence.

The final caveat is that the identification strategy is simply to assume that there is something exogenous about the variation in education and employment among each ethnic group and to use control variables to reduce omitted variable bias. In the context of current empirical studies, this may appear to be a strong assumption.

7 Conclusion

This paper contributes to a greater understanding of the causes of violence by examining local economic conditions associated with variation in participation rates during the Rwandan genocide. It exploits recently released data on crimes during the genocide, in combination with individual-level economic information from before the violence. The findings - that increases in education and decreases in employment among potential attackers are associated with greater levels of violence and the resources of potential victims are not associated with violence levels - are consistent with opportunity cost theories of violence and

theories of violence as political participation, but not with theories of relative deprivation and looting. Although still limited, to my knowledge, this is the best available data to quantitatively address causes of participation in the Rwandan genocide, and one of the best sources of sub-national data on civil conflict. Future work can continue to fill in the global image of causes of violence to understand in which cases the various theories apply. This paper provides a new addition to the still limited set of quantitative, sub-national studies of violence.

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Appendix

Figure 1: Mean asset score as a function of human capital score

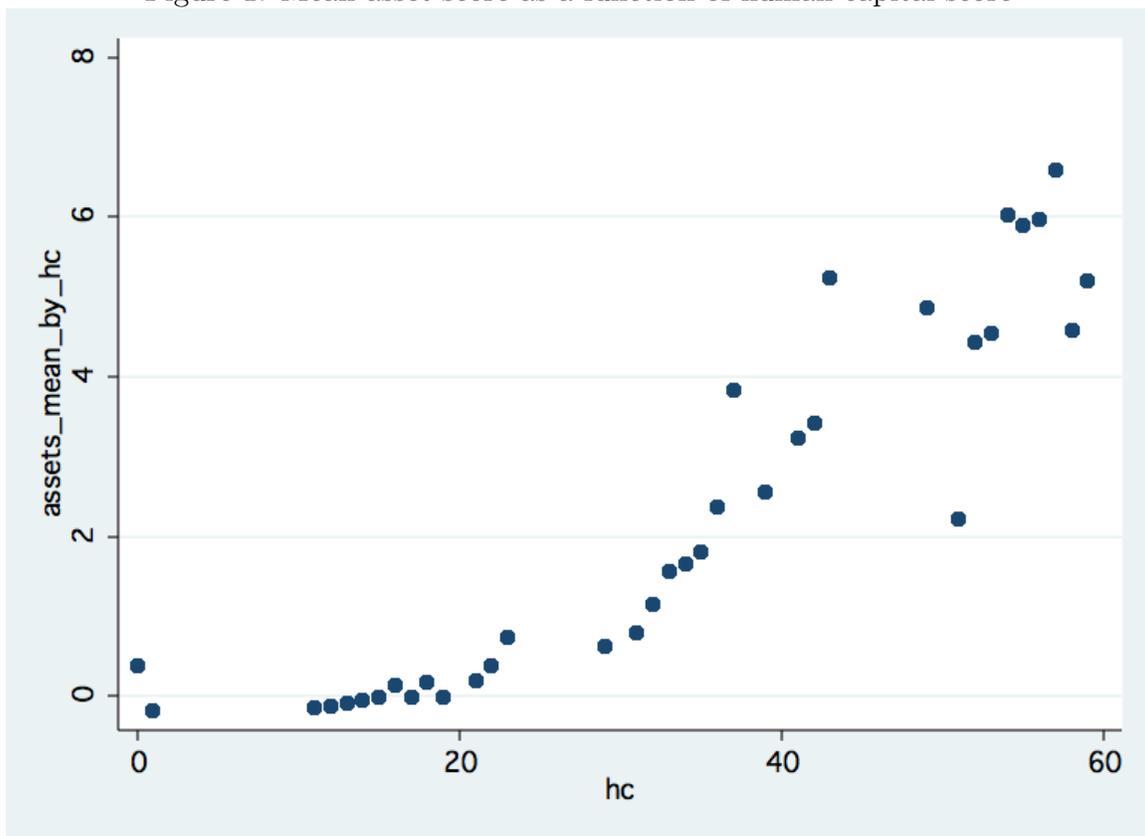


Figure 2:

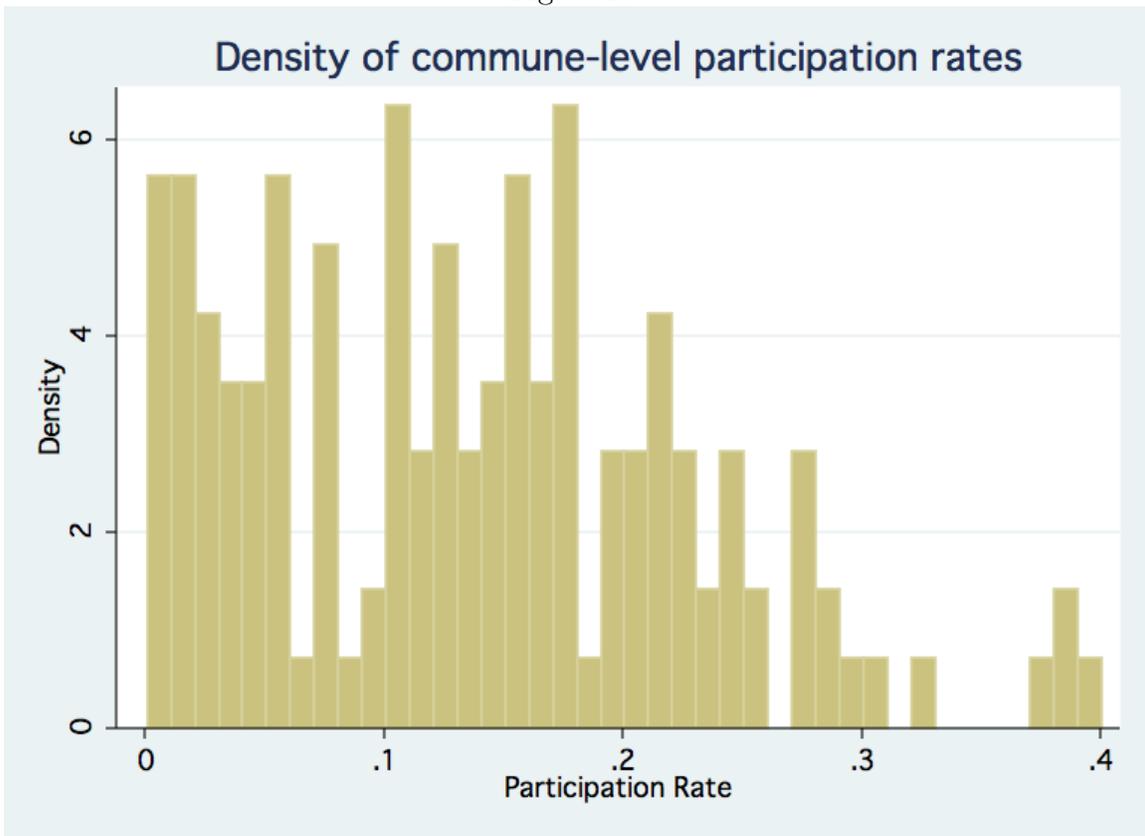


Figure 3: Commune-level participation rates as a function of the proportion Hutu

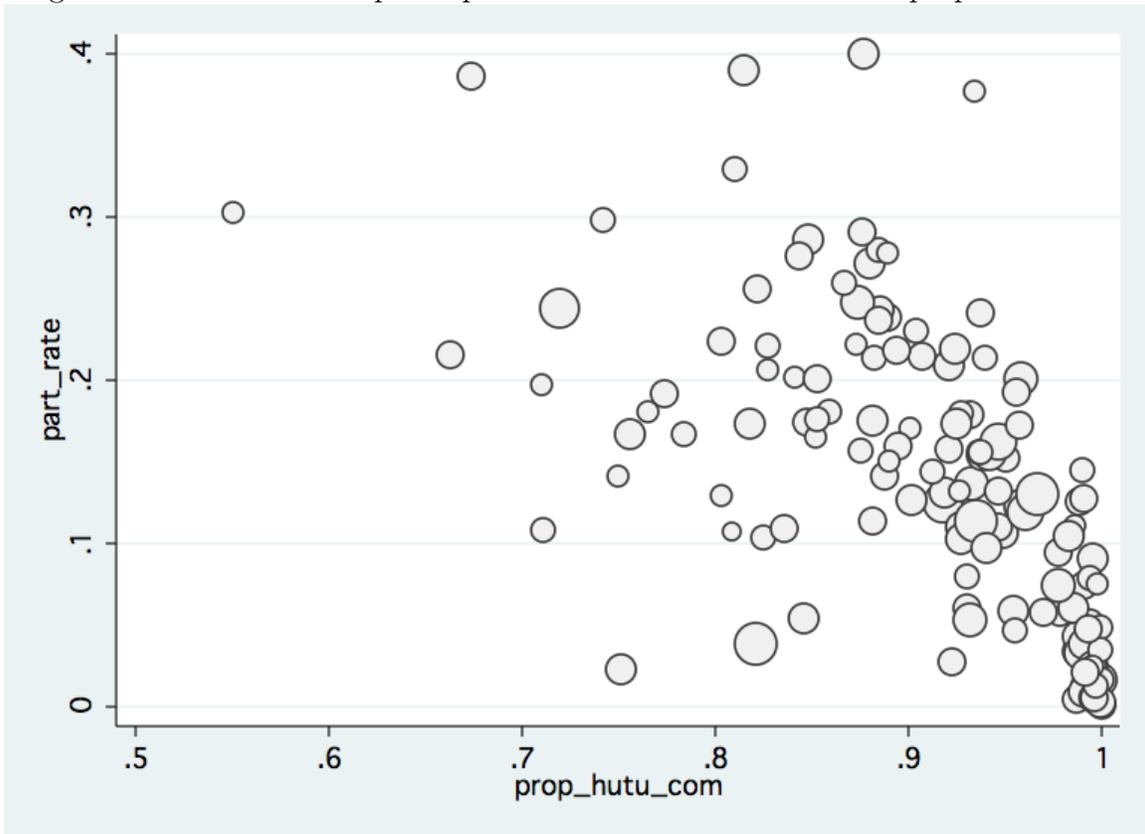


Figure 4:

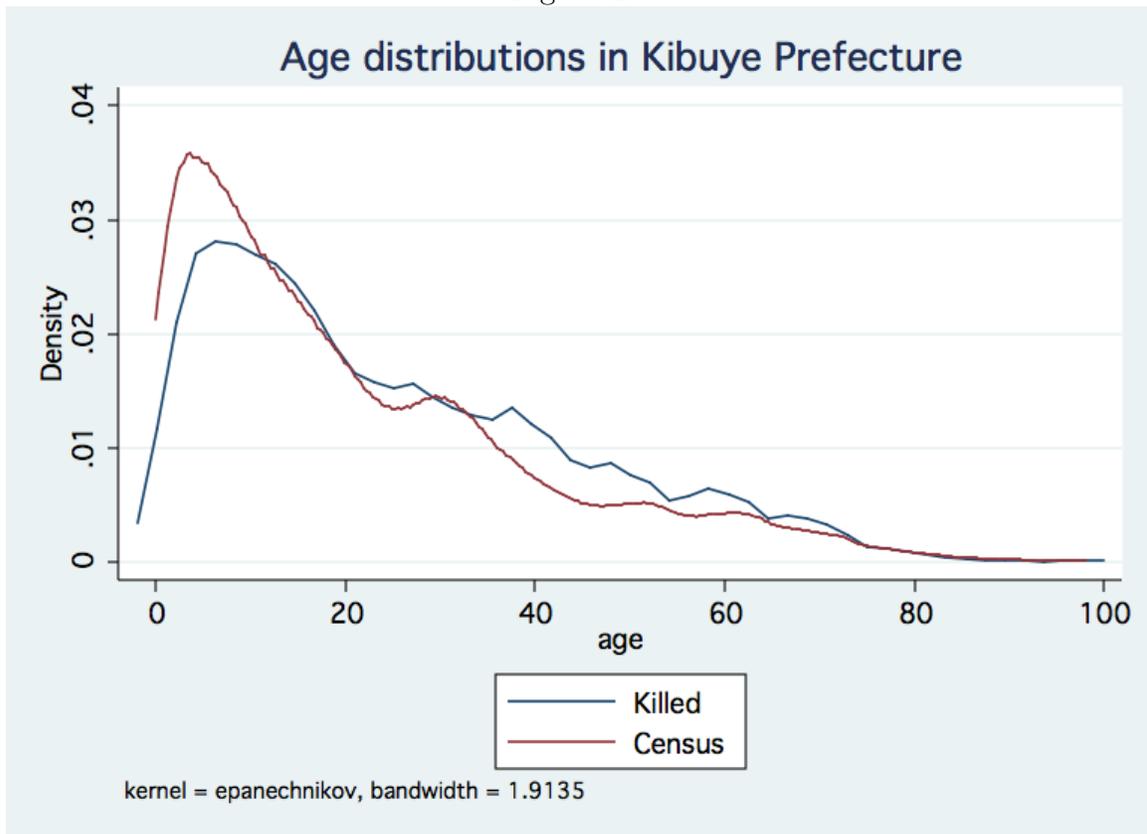


Table 1: 1996 Ministry of Higher Education

<i>Commune</i>	Victims	Perpetrators from Gacaca
Bicumbi	15000	8487
Birenga	10000	4521
Bugarama	457	2453
Butamwa	15000	3707
Butaro	0	34
Buyoga	0	1358
Bwisige	30	427
Cyabingo	120	582
Cyeru	40	633
Cymbogo	13879	3744
Cyumba	0	201
Cyungo	0	163
Gafunzo	13302	6167
Gaseke	2000	1336
	...	
Rukara	5130	3441
Rukira	5000	5585
Rukondo	437	4231
Runda	1095	6501
Runyinya	40000	3791
Rusatira	10000	0
Rushashi	100	1307
Rusumo	40000	8123
Rutare	100	1029
Rutobwe	12000	3354
Rutonde	8000	4543
Rutongo	15000	3600
Rwamiko	560	2626
Sake	28500	5865
Satinsyi	5460	2838
Shyanda	12000	3518
Taba	6712	6219
Tambwe	2780	3824
Tumba	50	1171
	.	.
	.	.

Notes: Correlation=0.329

Table 2: PRIO incidents

<i>Province</i>	Number of Incidents	Perpetrators from Gacaca
Butare	9	78037
Byumba	8	17217
Cyangugu	4	39395
Gikongoro	3	42366
Gisenyi	4	26835
Gitarama	10	91461
Kibungo	1	59547
Kibuye	2	57279
Kigali	39	87433
Ruhengeri	9	14477

Notes: Correlation=0.461

Table 3: Davenport and Stam

<i>Province</i>	Victims	Perpetrators from Gacaca
Butare	749680	78037
Byumba	68	17217
Cyangugu	34482	39395
Gikongoro	47503	42366
Gisenyi	22334	26835
Gitarama	115839	91461
Kibungo	19074	59547
Kibuye	165502	57279
Kigali	307827	81804
Kigali-Ville	20858	5629
Ruhengeri	6554	14477

Notes: Correlation=0.603

Table 4: Gacaca Validation

<i>Data Source</i>	Correlation
Ministry of Higher Education	0.329
PRIO	0.461
Davenport and Stam	0.603

Table 5: Summary Statistics

<i>Variable</i>	Hutu	Tutsi
Population share	0.871 (0.335)	0.081 (0.273)
Human Capital Score	9.313 (8.910)	12.818 (9.789)
Literate	0.517 (0.500)	0.673 (0.469)
Employed	0.074 (0.262)	0.113 (0.317)
Asset Score	-0.024 (0.920)	0.214 (1.279)
Owns a radio	0.286 (0.452)	0.349 (0.477)
Has electricity	0.021 (0.143)	0.046 (0.210)
Owns land	0.928 (0.258)	0.905 (0.294)
<i>Observations</i>	647010	60096

Table 6: Basic specifications

VARIABLES	(1) part_rate	(2) part_rate	(3) part_rate	(4) part_rate	(5) part_rate
Mean Education (Tutsi)	-0.0597 (0.0941)	-0.0850 (0.0976)	-0.0644 (0.107)	0.0752 (0.118)	0.0497 (0.128)
Mean Education (Hutu)	1.331** (0.523)	1.202** (0.536)	1.488** (0.603)	1.253** (0.601)	1.302* (0.693)
Percent formally employed (Tutsi)	0.0491 (2.455)	0.399 (2.651)	0.226 (2.916)	-0.117 (2.216)	0.207 (2.703)
Percent formally employed (Hutu)	-44.09*** (11.50)	-49.84*** (12.83)	-46.20*** (12.69)	-43.65*** (11.26)	-48.24*** (12.59)
Percent 18-30		40.99 (37.23)			37.29 (41.57)
Percent male		14.77 (64.26)			4.498 (70.85)
Percent born away			-1.716 (7.038)		1.351 (8.299)
Percent left			13.07 (12.61)		13.03 (12.96)
Radio ownership (Tutsi)				-3.738* (2.139)	-3.951* (2.257)
Radio ownership (Hutu)				1.233 (10.83)	1.872 (11.49)
Observations	137	137	137	135	135
R-squared	0.689	0.692	0.692	0.684	0.689

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All specifications include controls for density, population, proportion Hutu, and provincial fixed effects

Table 7: Only categories 1 and 2

VARIABLES	(1) part_rate12	(2) part_rate12	(3) part_rate12	(4) part_rate12	(5) part_rate12
Mean Education (Tutsi)	-0.0417 (0.0544)	-0.0658 (0.0593)	-0.0427 (0.0652)	0.0302 (0.0674)	0.0145 (0.0773)
Mean Education (Hutu)	0.712** (0.329)	0.615* (0.337)	0.809** (0.383)	0.670* (0.382)	0.692 (0.439)
Percent formally employed (Tutsi)	-0.0259 (1.347)	0.390 (1.566)	0.0967 (1.728)	-0.157 (1.302)	0.154 (1.708)
Percent formally employed (Hutu)	-22.11*** (7.178)	-27.79*** (8.648)	-25.38*** (8.159)	-21.60*** (6.718)	-27.37*** (8.226)
Percent 18-30		28.69 (24.53)			21.98 (28.06)
Percent male		27.37 (44.17)			14.90 (47.54)
Percent born away			-3.984 (5.361)		-1.936 (6.123)
Percent left			10.06 (8.310)		9.506 (8.637)
Radio ownership (Tutsi)				-2.111 (1.369)	-2.274 (1.450)
Radio ownership (Hutu)				0.478 (7.038)	0.918 (7.264)
Observations	137	137	137	135	135
R-squared	0.687	0.692	0.693	0.681	0.690

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All specifications include controls for density, population, proportion Hutu, and provincial fixed effects

Table 8: Only category 3

VARIABLES	(1) part_rate3	(2) part_rate3	(3) part_rate3	(4) part_rate3	(5) part_rate3
Mean Education (Tutsi)	-0.0180 (0.0477)	-0.0192 (0.0462)	-0.0217 (0.0499)	0.0450 (0.0641)	0.0352 (0.0640)
Mean Education (Hutu)	0.619*** (0.235)	0.587** (0.243)	0.679** (0.266)	0.583** (0.267)	0.610* (0.310)
Percent formally employed (Tutsi)	0.0750 (1.244)	0.00834 (1.224)	0.129 (1.308)	0.0406 (1.083)	0.0526 (1.148)
Percent formally employed (Hutu)	-21.98*** (5.674)	-22.05*** (5.658)	-20.82*** (5.965)	-22.05*** (6.281)	-20.88*** (6.452)
Percent 18-30		12.31 (17.02)			15.31 (18.43)
Percent male		-12.60 (27.55)			-10.40 (30.41)
Percent born away			2.268 (2.519)		3.286 (3.011)
Percent left			3.003 (5.688)		3.526 (5.786)
Radio ownership (Tutsi)				-1.627 (1.034)	-1.677 (1.056)
Radio ownership (Hutu)				0.755 (5.550)	0.954 (5.914)
Observations	137	137	137	135	135
R-squared	0.627	0.629	0.629	0.623	0.627

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All specifications include controls for density, population, proportion Hutu, and provincial fixed effects

Table 9: Interaction of education and unemployment within commune

VARIABLES	(1) part_rate	(2) part_rate	(3) part_rate	(4) part_rate	(5) part_rate
Hutu Mean Ed (normalized)	2.665*** (1.004)	2.171** (1.004)	2.711** (1.128)	2.326** (1.140)	2.285* (1.289)
Hutu Unemployment (normalized)	3.351*** (1.080)	3.548*** (1.185)	3.365*** (1.186)	3.075*** (1.055)	3.500*** (1.151)
Mean Ed*Unemployment (Hutu)	0.279 (0.226)	0.703* (0.362)	0.525 (0.372)	0.532 (0.352)	0.665* (0.385)
Mean Education (Tutsi)	-0.0540 (0.0932)	-0.0802 (0.0972)	-0.0525 (0.106)	0.0882 (0.112)	0.0581 (0.121)
Percent formally employed (Tutsi)	-0.0690 (2.508)	-0.0867 (2.753)	-0.268 (2.993)	-0.566 (2.218)	-0.301 (2.737)
Percent 18-30		51.22 (38.22)			46.22 (41.91)
Percent male		23.68 (64.95)			14.16 (71.09)
Percent born away			-3.240 (7.434)		0.350 (8.506)
Percent left			11.72 (12.60)		10.79 (13.04)
Radio ownership (Tutsi)				-3.800* (2.057)	-3.980* (2.165)
Radio ownership (Hutu)				1.366 (10.82)	2.075 (11.45)
Observations	137	137	137	135	135
R-squared	0.689	0.697	0.694	0.686	0.693

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All specifications include controls for density, population, proportion Hutu, and provincial fixed effects

Table 10: Interaction of education and unemployment within individual

VARIABLES	(1) part_rate	(2) part_rate	(3) part_rate	(4) part_rate	(5) part_rate
Mean Education (Tutsi)	-0.0597 (0.0967)	-0.0820 (0.0998)	-0.0639 (0.109)	0.0817 (0.124)	0.0601 (0.131)
Mean Ed of Unemployed Hutu	1.220** (0.598)	1.088* (0.610)	1.309** (0.656)	1.165* (0.654)	1.149 (0.725)
Mean Ed of Employed Hutu	0.0980 (0.188)	0.0856 (0.192)	0.122 (0.192)	0.0787 (0.197)	0.0856 (0.205)
Percent formally employed (Tutsi)	-0.0987 (2.494)	0.241 (2.706)	0.0403 (2.943)	-0.240 (2.200)	0.0629 (2.671)
Percent formally employed (Hutu)	-28.92*** (9.750)	-35.77*** (12.19)	-28.95*** (10.46)	-30.59*** (11.35)	-34.66** (13.39)
Demographic Controls		X			X
Migration Controls			X		X
Radio Controls				X	X
Observations	137	137	137	135	135
R-squared	0.689	0.692	0.691	0.684	0.689
F-stat	2.663	2.040	2.598	2.188	1.783
p-value	0.105	0.156	0.110	0.142	0.185

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

All specifications include controls for density, population, tex(frag) proportion Hutu, and provincial fixed



Lost In Transition

How Civil War Violence Can Impair the Foundations for Market Development

- The Case of Tajikistan -

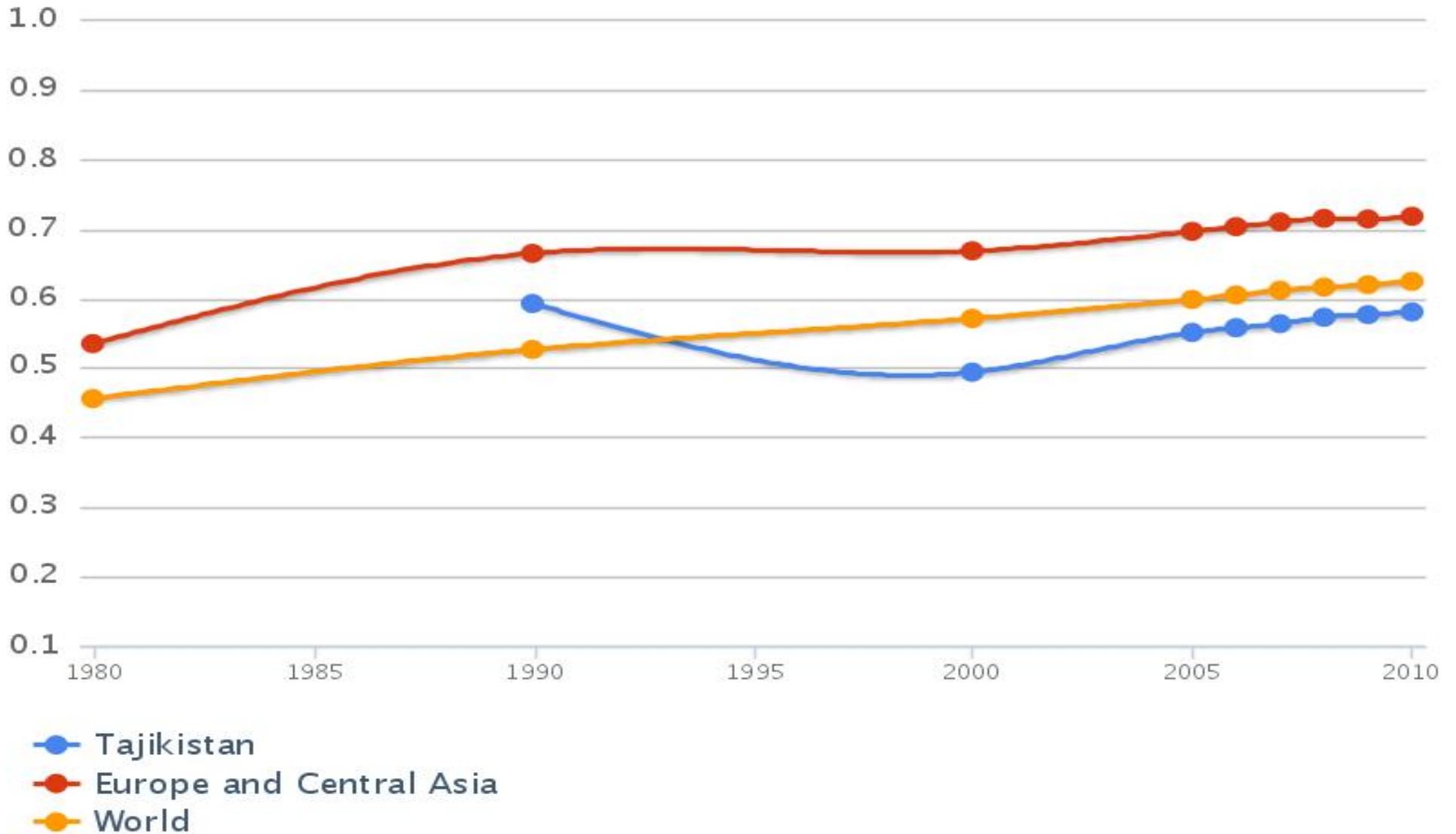
Alessandra Cassar, Pauline Grosjean and Samuel Whitt

Motivation

- Civil war and endogenous formation of preferences
 - Inter-group conflicts at the origin of human altruism and pro-social behavior (Darwin 1873)
 - Culture gene co-evolution: same result
- Wars, state formation and market development: State building or conflict trap?
 - Wars and inter-group competition as preconditions for state formation and nation building (Tilly and Ardant 1975)
 - Wars as ‘development in reverse’: political and social disintegration => conflict trap (Collier 2004)

⇒ *What is the legacy of conflict on pro-social and political preferences?*

10 years after the end of the conflict, Tajikistan has still not recovered (HDI)



This Paper

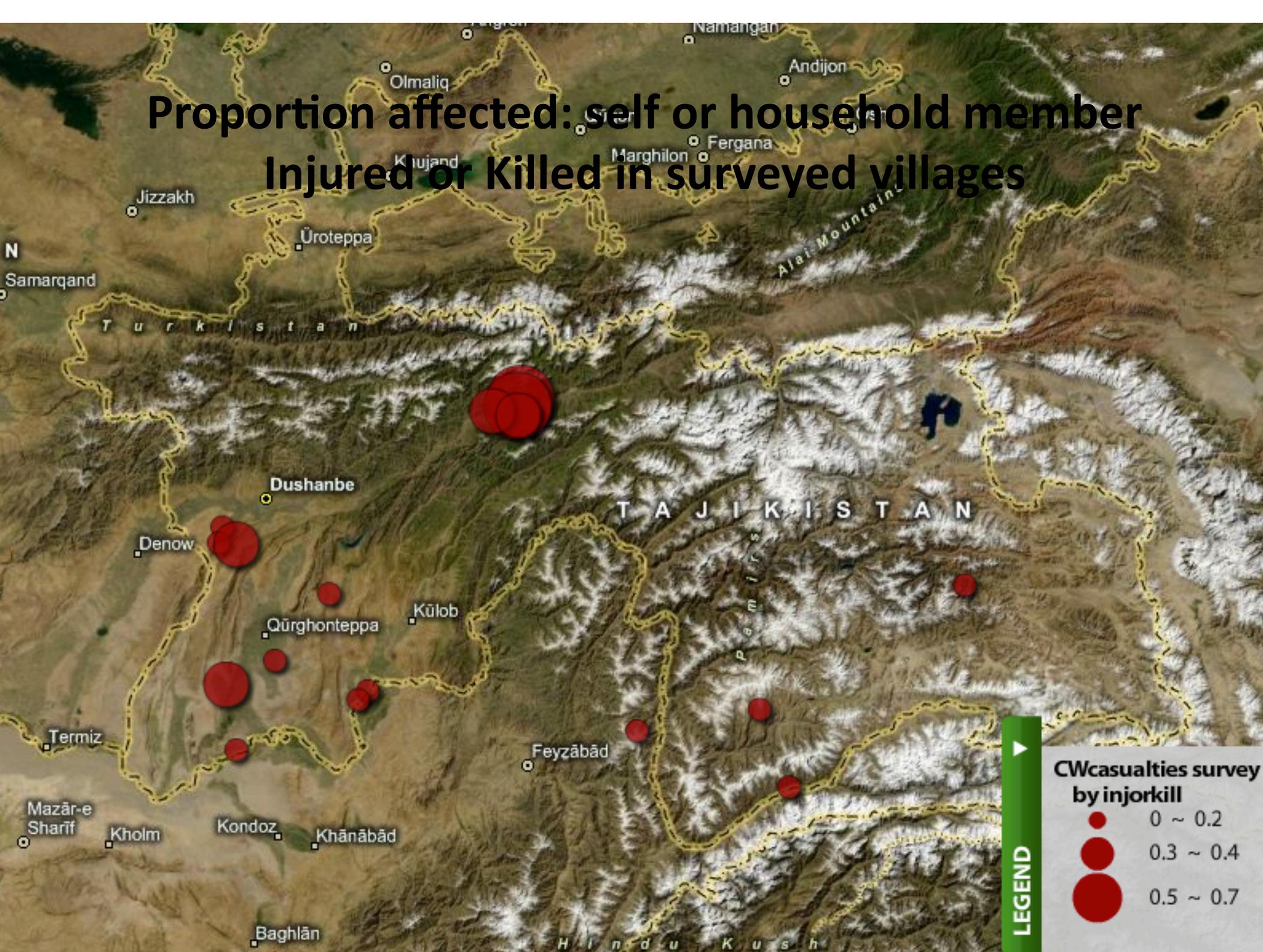
- Experimental and survey evidence
- Conducted simplified DG and TG and survey
- 2 treatments: within village - outside village
- 425 subjects in 4 regions and 17 villages



Tajik Civil War

- Violence broke out after proclamation of independence 1992
- Peace Agreement in 1997
- Regional and ideological roots of the conflict: Communist vs. United Tajik Opposition
- Official estimates of 50,000 - 100,000 dead, 1 million displaced (1992 pop: 5 million)
 - 20% of our sample “self or family member injured or family member killed”. Nationally representative average closer to 8%
- Most of fighting in regions with inter-mixed populations and allegiances
 - Inability to apply basic cues such as ethnicity or language to identify friends or foes

Proportion affected: self or household member Injured or Killed in surveyed villages



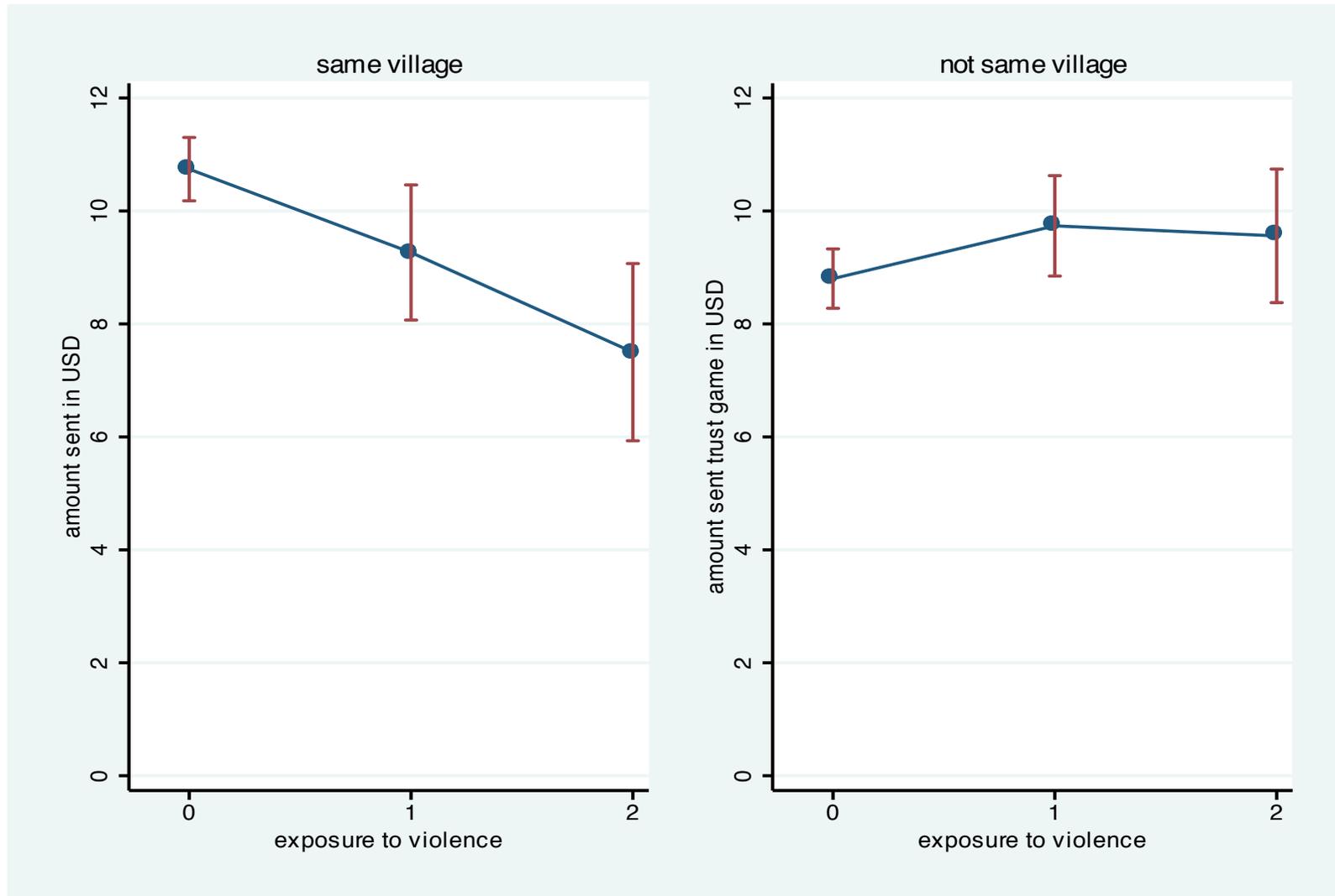
Hypothesis and Identification

- Hypotheses
 - *H1: Civil war violence opens a gap between trust towards different groups with less trust towards people in same village*
 - *H2: Civil war violence opens a gap between fairness preferences towards different groups by giving less to those in same village*
- Identification
 - Region and village fixed effects
 - Selection on observables: pre 1992 characteristics
 - Alternative samples:
 - Restrict sample to non movers
 - Restrict sample to those 20 or younger in 1992

Experimental Findings

- Trust Game: Sharp decrease in local trust
 - 40% decrease in donations to someone from same village
 - Slight increase in trust towards anonymous stranger

Behavior in Trust Game: Sharp decrease in donations within same village



Trust Game: Sharp decrease in local trust

	1	2	3	4	5	6	7	8
	Offers Trust Game (mean: 9.81)							
	Injured				Killed			
victimization	-0.38	-0.32	1.30	1.62+	0.78	1.00	1.89*	2.21**
	[0.83]	[0.92]	[1.08]	[1.02]	[0.77]	[0.74]	[0.99]	[0.98]
same village*victimization			-3.94**	-4.62**			-2.66+	-3.06+
			[1.82]	[1.88]			[1.67]	[1.88]
same village	1.23	1.37	1.87	2.33	1.27	1.41	1.74	2.05
	[1.16]	[1.60]	[1.26]	[1.71]	[1.16]	[1.59]	[1.30]	[1.78]
Controls	ext	ext	ext	ext	ext	ext	ext	ext
FE	region	village	region	village	region	village	region	village
Observations	413	413	413	413	413	413	413	413
R-squared	0.061	0.114	0.072	0.128	0.062	0.116	0.067	0.123

Robust standard errors clustered at the village level.

Controls: age, gender, education, any household member of former communist party, ethnicity, region where lived in 1992.

Experimental Findings

- Trust Game: Sharp decrease in local trust
 - 40% decrease in donations to someone from same village
 - Slight increase in trust towards anonymous stranger
- Dictator Game: increase in overall generosity and egalitarian preferences, but not towards those from same village
 - 20% to 25% increase in donations overall
 - However, those most affected by conflict gives substantially less to others in their village (about 30% decrease in donations)
 - More egalitarian preferences overall (20% more likely to offer equal split), but not towards same village (25% less likely)

Dictator Game: Less local fairness but more generosity towards anonymous stranger

	1	2	3	4	5	6	7	8
	Egalitarian Split Dictator Game (mean: 0.23)							
	injured				killed			
victimization	0.08	0.07	0.19**	0.16**	0.08	0.08	0.20**	0.19*
	[0.06]	[0.07]	[0.07]	[0.07]	[0.05]	[0.06]	[0.10]	[0.09]
same village*victimization			-0.24**	-0.20			-0.30**	-0.29**
			[0.11]	[0.13]			[0.13]	[0.13]
same village	0.03	-0.04	0.06	0.00	0.03	-0.04	0.08*	0.02
	[0.05]	[0.06]	[0.04]	[0.05]	[0.05]	[0.06]	[0.04]	[0.05]
FE	region	Village	region	Village	region	Village	region	village
controls	ext	ext	ext	ext	ext	ext	ext	ext
Observations	413	413	413	413	413	413	413	413
R-squared	0.082	0.126	0.093	0.133	0.082	0.127	0.099	0.142

Robustness

- Sub sample of non movers
- Sub sample of those 20 or younger in 1992
- Wider set of controls

Survey Results: Economic and Political Preferences

	1	2	3	4	5	6	7	8
	Importance of knowing trader personally		Freedom in economy		Favor market economy		Favor democracy	
injured	0.58**		-0.25**		-0.10*		-0.20***	
	[0.21]		[0.09]		[0.05]		[0.06]	
killed		0.47***		-0.29***		-0.19**		-0.15**
		[0.13]		[0.08]		[0.07]		[0.06]
Extended controls	yes	yes	yes	yes	yes	yes	yes	yes
Village FE	yes	yes	yes	yes	yes	yes	yes	yes
Obs.	413	413	397	397	411	411	409	409
R-squared	0.172	0.163	0.256	0.268	0.194	0.207	0.302	0.296

Robust standard errors clustered at the village level. Controls: age, gender, education, any household member of former communist party, ethnicity, region where lived in 1992

War experiences reinforce group membership and participation, but...

	1	2	3	4	5	6
	attended community meetings past month		part. in groups or assoc.		member mosque/religious group	
injured	0.26**		0.46***		0.43***	
	[0.11]		[0.07]		[0.12]	
killed		0.30***		0.51***		0.45***
		[0.09]		[0.12]		[0.07]
Extended controls	yes	yes	yes	yes	yes	yes
Village FE	yes	yes	yes	yes	yes	yes
Observations	402	402	399	399	334	334
R-squared	0.2	0.213	0.271	0.279	0.255	0.275

Robust standard errors clustered at the village level. Controls: age, gender, education, any household member of former communist party, ethnicity, region where lived in 1992

...such collective action associated with further erosion of local trust

	1	2	3	4	5	6
	Offers Trust Game					
part. in groups or assoc.	-0.21	-0.5	-0.65*	-0.21	-0.51	-0.65
	[0.36]	[0.35]	[0.35]	[0.36]	[0.41]	[0.40]
injured	-0.2	1.43	-7.52***	-0.15	1.80*	-5.26***
	[0.80]	[1.04]	[1.20]	[0.91]	[0.98]	[1.23]
same village*part. groups		0.97*	1.28**		0.99	1.27**
		[0.54]	[0.47]		[0.68]	[0.59]
same village*injured		-3.99**	9.16*		-4.77**	5.54
		[1.77]	[4.76]		[1.88]	[4.84]
part. groups*injured			9.61***			7.58***
			[1.37]			[1.41]
same village* part. groups*injured			-14.66***			-11.49**
			[4.84]			[5.01]
Extended controls	yes	yes	yes	yes	yes	yes
FE	region	region	region	village	village	village
Observations	399	399	399	399	399	399
R-squared	0.063	0.077	0.094	0.114	0.13	0.14

Robust standard errors clustered at the village level. Controls: same village treatment age, gender, education, any household member of former communist party, ethnicity, region where lived in 1992

Kinship ties vs. formal rule of law

- Victimization associated with stronger kinship ties, higher reliance on kinship based dispute adjudication mechanisms and weaker reliance on formal law

	1	2	3	4	5	6
	should report info to police		turn to relatives if cheated in markets		Support freedom to marry	
injured	-0.35***		0.15*		-0.08	
	[0.09]		[0.08]		[0.06]	
killed		-0.37***		0.04		-0.08**
		[0.09]		[0.07]		[0.03]
Extended controls	yes	yes	yes	yes	yes	yes
Village FE	yes	yes	yes	yes	yes	yes
Observations	394	394	413	413	342	342
R-squared	0.104	0.115	0.089	0.075	0.567	0.566

Conclusion: Lost in Transition!

- Negative, persistent effects of violence on local trust and fairness
 - Opposite effects towards anonymous strangers
 - Lower stated preferences for participation in impersonal exchange, preferences for market liberalization and democracy among victims
 - Higher participation in collective action (Bellows and Miguel 09, Blattman 09) but such collective action associated with further erosion of local trust
 - Victimization associated with stronger kinship-based norms of conflict resolution mechanisms as opposed to reliance on formal rule of law
- ⇒ More consistent with political fragmentation and conflict trap model than state building model

External Validity: 2010 Life in Transition Survey

- 32 countries, 39,000 observations
- Influence of WWII, recent international and civil conflicts in ex-Yugoslavia, Kosovo, North Caucasus, Tajikistan, Kyrgyzstan
- Civil war violence:
 - erodes trust in central institutions
 - reinforces collective action, but...
 - ...collective action that is associated with further erosion of trust in institutions and social trust
- Winning an international conflict:
 - reinforces trust in institutions
 - associated with less collective action

The Economic Costs of Naxalite Violence and the Economic Benefits of a Unique Robust Security Response

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March 2011

- Frey, Luechinger and Stutzer (2007), Llusà and Tavares (2007), Enders and Sandler (2008) [Surveys]
- Macroeconomic Costs
 - reduce per capita GDP growth
 - reduce FDI inflows
 - reduce domestic investment, savings
 - redirect public expenditure to defence
 - reduce exports, trade flows
- Microeconomic Costs
 - reduce tourist inflows, tourism receipts
 - reduce demand for domestic airline travel, hotel stays
- However, no such studies in the Indian context

The Naxalite Problem in India

- Political movement with the objective to seize "political power, i.e., state power"
 - Origin: Peasant uprising in 1967 in Naxalbari village, West Bengal
- Prominent violent Naxalite groups
 - Communist Party of India (Marxist-Leninist) i.e. CPI(ML) 1969
 - Maoist Communist Center i.e. MCC 1975
 - Communist Party of India (Marxist-Leninist) People's War i.e. PWG 1980
- Alarming recent spurt in Naxalite activity
 - 76 districts in 9 states in 2005
 - 182 districts in 16 states in 2007

Naxalite Affected States



Economic Costs of Naxalite Activity in India

- Naxalites have affected economic activity (source: various newspapers)
 - destroying pipelines in Chattisgarh
 - destroying road construction in Bihar
 - damaging railway infrastructure in Jaharkhand and Orissa
 - damaging schools, mobile towers
- Joshi (2010) estimates investments worth Rs. 130 bn are tied up in projects affected by Naxalite activity

- States rely on regular police force, reinforcements from central police organizations
 - No force specifically trained in counter-insurgency, jungle warfare
- Only Andhra Pradesh raised GREYHOUNDS (1989)
 - Specially trained elite police force solely to combat Naxals

- What is the economic cost of Naxalite violence in the Naxal-affected states?
 - Loss of on average 10.77% of pc NSDP over the period 1980-2000
- What is the economic benefit of the state's security response to extremist violence?
 - Gain of on average 16.45% of pc NSDP over the period 1989-2000

Synthetic Control Method (SCM)

- Synthetic Control Methodology in Comparative Case Study Approach
 - Abadie and Gardeazabal (2003)
 - Abadie, Diamond and Hainmueller (2009)
- $J + 1$ regions
- $1, \dots, T_0, \dots, T$ time periods. Region 1 treated from T_0 onwards
- $Y_{it} = Y_{it}^N + \alpha_{it}D_{it}$ is the observed outcome for region i at time t
- $\alpha_{it} = Y_{it}^I - Y_{it}^N$ is the effect of the intervention on region i at time t
- To estimate $(\alpha_{1, T_0+1}, \dots, \alpha_{1, T})$ need to estimate Y_{1t}^N , for $t \in \{T_0+1, \dots, T\}$

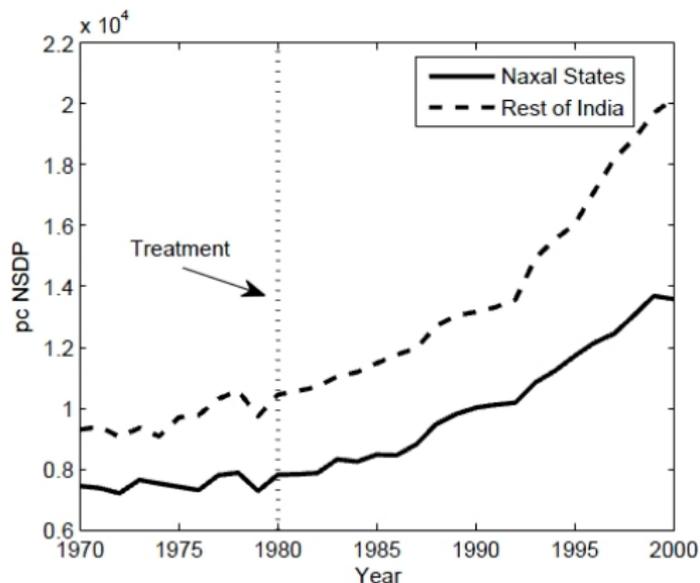
Synthetic Control Method (Contd)

- Can motivate SCM as a generalized diff-in-diff
 - Allows for time varying unobserved effects
- $Y_{it}^N = \delta_t + \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{it}$
- If $\left(Z_1 - \sum_{j=2}^{J+1} \omega_j^* Z_j \right) = 0$ and $\left(Y_{1t}^N - \sum_{j=2}^{J+1} \omega_j^* Y_{jt}^N \right) = 0 \forall t \in \{1, \dots, T_0\}$ for some weights $\{\omega_2^*, \dots, \omega_{J+1}^*\}$
- Then $\hat{\alpha}_{it} = Y_{1t} - \sum_{j=2}^{J+1} \omega_j^* Y_{jt}^N$ for $t \in \{T_{0+1}, \dots, T\}$ is the estimated treatment effect
- The vector of weights W^* is chosen to min $(X_1 - X_0 W) V' (X_1 - X_0 W)$
 - X is matrix of pre-treatment Z and Y
 - W is the weight for controls

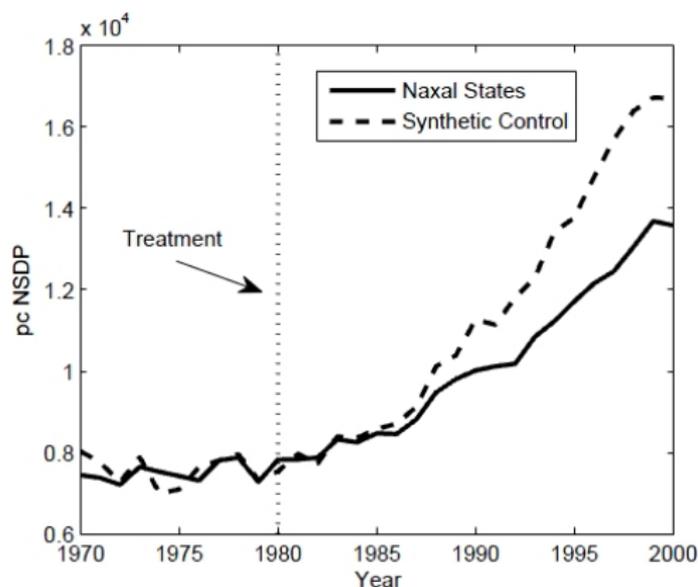
Part 1: The Economic Cost of Naxalite Violence

- Treated Unit: called Naxal States (avg of Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Karnataka, Orissa, Uttar Pradesh and West Bengal)
- Control Units: called Rest of India (Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Kerala, Pondicherry, Rajasthan, Tamil Nadu)
- Outcome Variable: real NSDP per capita (1999 prices)
- Pre-treatment period: 1970-1979
- Treatment Period: 1980-2000

Trends in pc NSDP: Naxal States vs. Rest of India



Trends in pc NSDP: Naxal States vs. Synthetic Control



- Loss: on average 10.77% of pc NSDP over the period 1980-2000

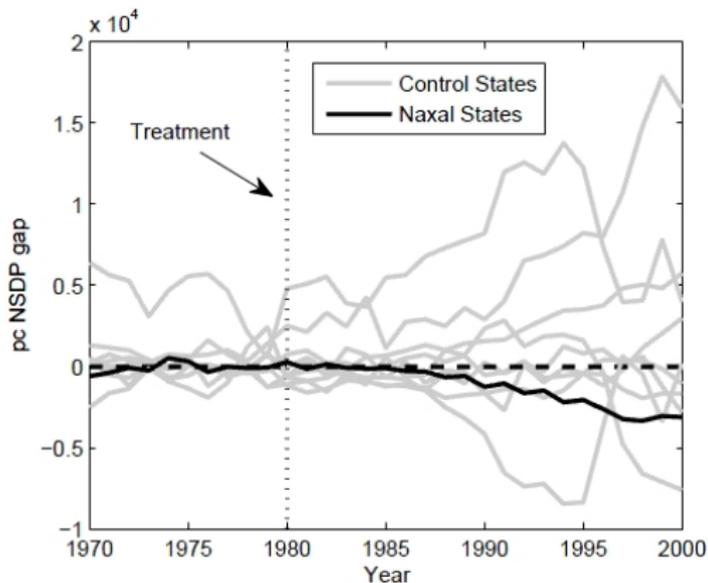
pc NSDP Predictor Means

Variables	Naxal States	Synthetic Control	Avg of Control States
HDI	0.34	0.30	0.39
Population density (persons / sq.km.)	202.97	226.28	702.61
Road density (km / 1000 sq.km. area)	557.94	550.52	2222.50
Per capita electricity consumption (KwH)	91.96	120.07	172.34
Urban hh with safe drinking water (%age)	68.62	73.68	76.25
1972 NSDP per capita (1999 Rupees)	7211.36	7274.64	10196.18
1973 NSDP per capita (1999 Rupees)	7645.42	7881.29	10755.26
1977 NSDP per capita (1999 Rupees)	7805.32	7808.02	11718.78
1978 NSDP per capita (1999 Rupees)	7878.49	7958.49	12234.85
All variables unless otherwise mentioned are averaged over 1970-1979			

State Weights

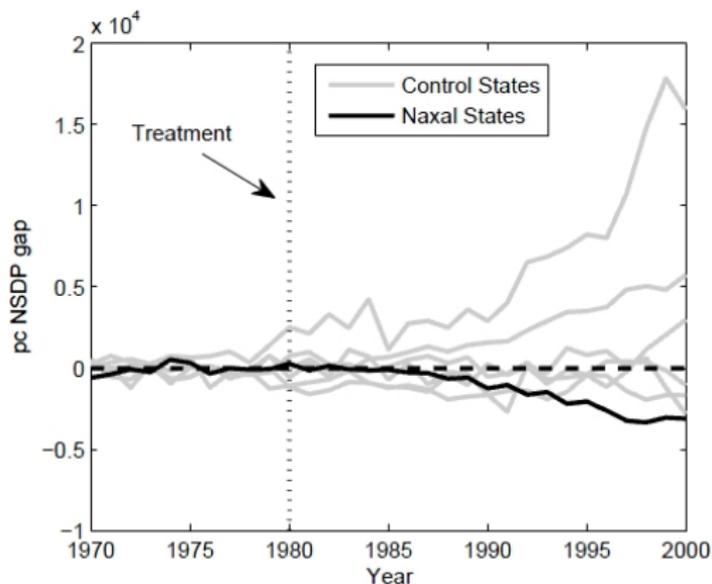
State	Weight
Goa	0.00
Gujarat	0.00
Haryana	0.00
Himachal Pradesh	0.00
Kerala	0.00
Rajasthan	0.46
Tamil Nadu	0.54
Delhi	0.00
Pondicherry	0.00

pc NSDP Gap in Naxal States and Placebo Gaps in all Control States



pc NSDP Gap in Naxal States and Placebo Gaps in all Control States

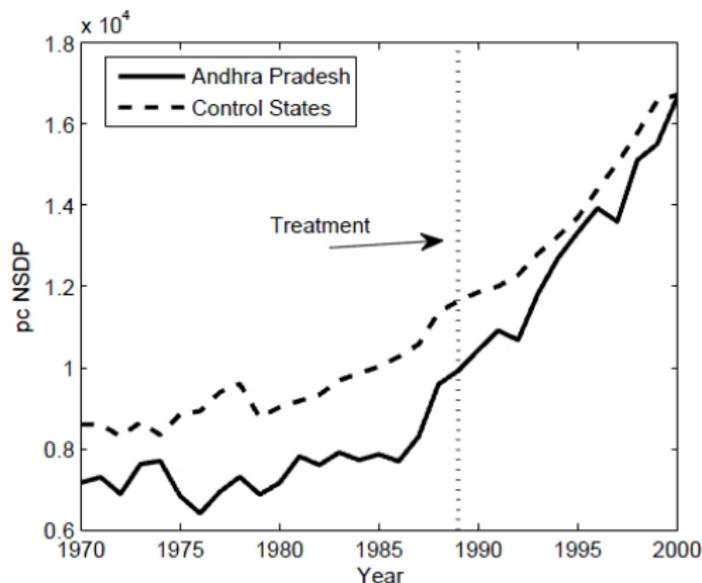
(Discards States with Pre-Treatment MSPE Three Times Higher than Naxal States)



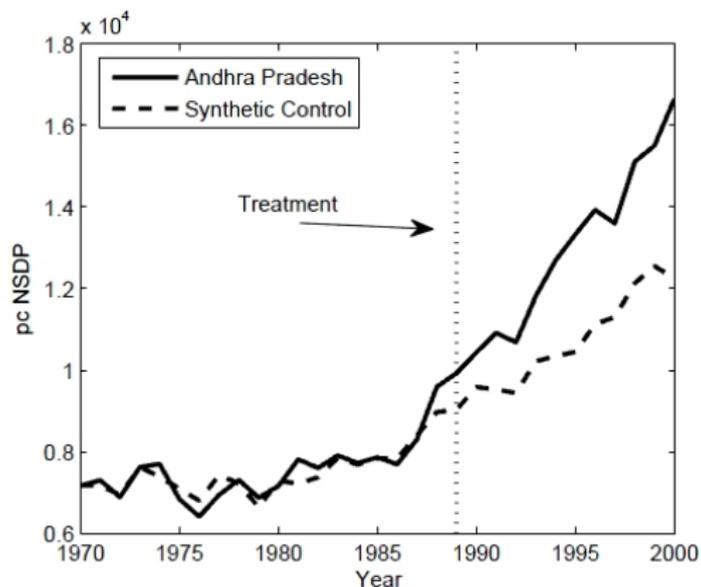
Part 2: Economic Benefit of a Security Response

- Treatment: Introduction of "Greyhounds" in 1989
- Treated Unit: Andhra Pradesh
- Control Units: Bihar, Madhya Pradesh, Maharashtra, Karnataka, Orissa, Uttar Pradesh and West Bengal
 - Controls are Naxalite affected states that did not raise Greyhounds type force
- Outcome Variable: real NSDP per capita (1999 prices)
- Pre-treatment period: 1970-1988
- Treatment Period: 1989-2000

Trends in pc NSDP: Andhra Pradesh vs. Control States



Trends in pc NSDP: Andhra Pradesh vs. Synthetic Control



- Gain: on average 16.45% of pc NSDP over the period 1989-2000

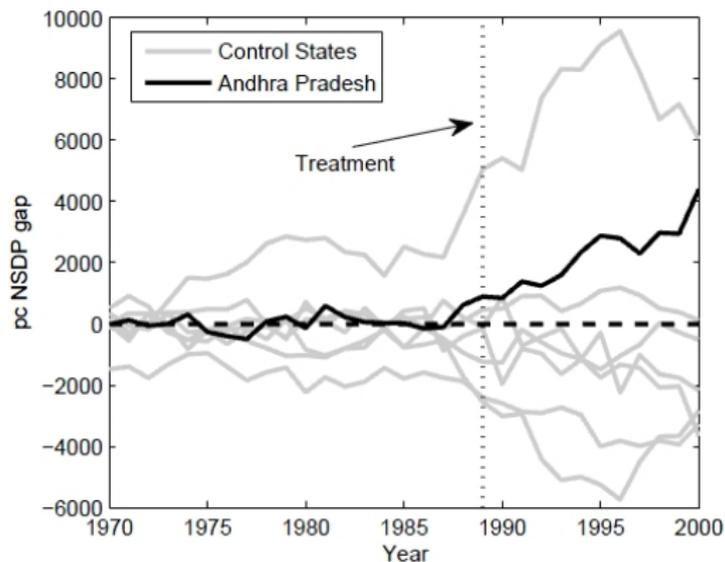
pc NSDP Predictor Means

Variables	Andhra Pradesh	Synthetic Control	Avg of Control States
HDI	0.30	0.28	0.29
Population density (persons / sq.km.)	176.50	176.84	303.86
Road density (km / 1000 sq.km. area)	366.00	396.36	487.14
Per capita electricity consumption (KwH)	78.60	94.86	107.54
Urban hh with safe drinking water (%age)	63.27	68.36	70.90
1970 NSDP per capita (1999 Rupees)	7169.79	7178.38	7485.08
1972 NSDP per capita (1999 Rupees)	6888.87	6941.35	7257.43
1973 NSDP per capita (1999 Rupees)	7625.09	7626.81	7648.33
1983 NSDP per capita (1999 Rupees)	7911.37	7847.85	8383.47
1984 NSDP per capita (1999 Rupees)	7722.79	7686.90	8328.26
All variables unless otherwise mentioned are averaged over 1970-1979			

State Weights

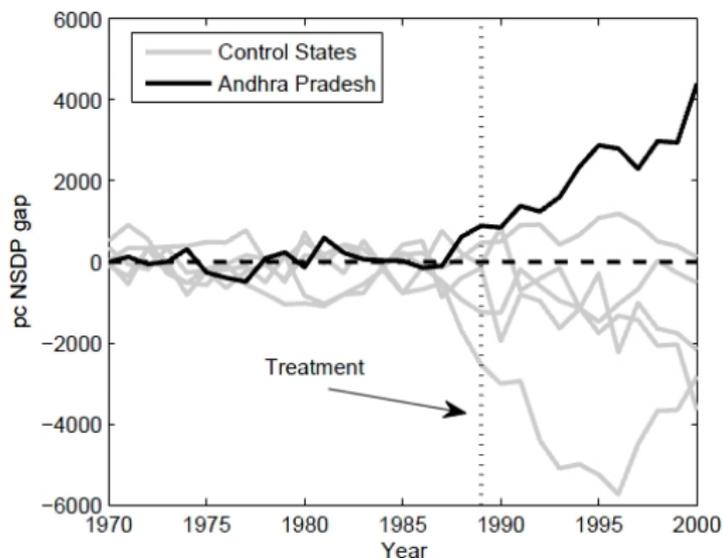
State	Weight
Bihar	0.18
Karnataka	0.33
Madhya Pradesh	0.45
Maharashtra	0.00
Orissa	0.04
Uttar Pradesh	0.00
West Bengal	0.00

pc NSDP Gap in Andhra Pradesh and Placebo Gaps in all Control States



pc NSDP Gap in Andhra Pradesh and Placebo Gaps in all Control States

(Discards States with Pre-Treatment MSPE Five Times Higher than Andhra Pradesh)



- Economic cost of Naxalite violence in Naxalite-affected States
 - Loss of on average 10.77% of pc NSDP over the period 1980-2000
 - Average pc NSDP loss of Rs. 1,273 per year
 - Naxals not only a significant threat to the internal security of India but also its growth story
- Economic benefits of security response by Andhra Pradesh
 - Gain of on average 16.45% of pc NSDP over the period 1989-2000
 - Average pc NSDP gain of Rs. 2,221 per year
 - Greyhounds yield a significant "Security Dividend" for Andhra Pradesh