

# Where and When does Violence Pay Off?

## The Algerian Civil War

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### **Abstract**

I draw a geographically and temporally disaggregated model of the location and course of the Algerian civil war, using new battle event and location data from newspaper reports. I show that the war was located in areas and at moments in time in which both the rebels and the government were about equally strong, according to my relative strength index. Further, tactical considerations and economic adjustment seem to play a role in the conflict.

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## **Abbreviations**

ACLED Armed Conflict Location and Event Dataset

AIS Islamic Salvation Army (Armee Islamique du Salut)

ANP National Popular Army (Armee Nationale Populaire)

CSCW Center for Studies of Civil War

CIESIN Center for International Earth Science Information Network

DZD Algerian Dinar

FIS Islamic Salvation Front (Front Islamique du Salut)

FLN National Liberation Front (Front de Liberation Nationale)

GIA Armed Islamic Group (Groupe Islamique Arme)

GSPC Salafist Group for Preaching & Combat (Groupe Salafiste pour la Predication et le Combat)

HCE High Council of State (Haut Conseil d'Etat)

IMF International Monetary Fund

JORA Official Journal of the Algerian Republic (Journal Officiel de la Republique d'Algerie)

MIA Armed Islamic Movement (Mouvement Islamique Arme)

NGA National Geospatial Intelligence Agency

RCSI Relative Government Strength Index

RRSI Relative Rebel Strength Index

SEC Strength Equality Condition

# 1 Introduction

The Algerian civil war has been lasting from 1992 to 2002 and lingers on on a low level since then. It was sparked by the interruption of the first Algerian legislative elections. The Front Islamique du Salut (Islamic Salvation Front FIS) party was bound to win these.

On January 11, 1992, the Army deposed President Chadli Bendjedid in a bloodless coup, outlawed the FIS, and sent most of its senior members to detainment camps in the Sahara. This complex political situation prior to the war is perhaps best illustrated in a passage by Roberts (2003:121): "To speak of the downfall of Chadli as a military coup, is to devalue the term very seriously. Ben Bella was overthrown by what could arguably be called a coup in 1965; his palace was surrounded by troops, he was arrested and led away in handcuffs and not seen again for the next fourteen years. Chadli resigned, briefly explained himself to the nation in a televised address, and then went home. [...] All that happened on 11 January was that the mandate was cancelled by those who had furnished it."

The Army then took power, establishing the five man junta "Haut Comite d'Etat" (HCE) as the executive body for Algeria. Roberts heads on to conclude that in fact with the coup "the Algerian Officer Corps were not flouting the democratic will of the people, they were arguably reflecting it. With only 3.26 million votes, that is a mere 25% of the electorate, the FIS was badly placed to claim that the massive legislative majority it was heading for represented the will of the people as a whole". Effectively, only 52% of the electorate had voted in these elections.

In the case of Algeria, there existed high vulnerability to a civil war onset due to the change in polity (Collier and Hoeffler 2004), that went along with a process of democratization in 1989-1991. It was exacerbated by low hydrocarbon prices, which led to a virtually bankrupt government (Martinez 2000:92) and which blatantly exposed the regime's problem of widespread corruption. This weakness was an opportunity best exploited by the FIS electoral program, which could be called populist by most standards (Roberts 2003:162). Among other aspects, the FIS had "virtually nothing to say about economic policy" (Roberts 2003:83).

Oil exports are the primary source of government revenue in this resource-rich country (up to 75%, in 2005); oil exports also accounted for more than 95% of total exports for the entire period of analysis (IMF 2007).

I am not interested in the war onset, which has been analyzed in detail already in Lowi (2006). I will, in contrast, build a geographically and temporally disaggregated model of civil war violence to predict and explain the location of war events and the intensity of the war in Algeria. My objective is to determine which incentives determine the location of civil war events over time and

within the country.

Models of violence within civil wars have only recently become the focus of the research community. Kalyvas (2006) writes on the logic of one-sided violence, and Hegre, Ostby and Raleigh (2007) develop a spatially disaggregated model of civil war violence. My paper attempts to fill a gap which is still left in the literature by including a time dimension.

To know and to be able to predict when and where violence will take place during a civil war has various important implications. First, it allows specially targeted policies to influence the course of a war, eventually reducing its destruction toll. Second, it provides us with new insights about local economic and political causes of civil wars.

## **1.1 Explaining the violence**

### **1.1.1 Economic Indicators: Target Value, Population, and Resources**

According to recent research, so-called target value is a factor in locating civil war events. Hegre, Ostby and Raleigh (2007:5) perhaps express it best: "Both parties to a conflict will target strategic locations such as crossroads, bridges, ports and airports held by the opponent, and invest resources to protect them. Another factor is the extent to which the location can provide revenue to the parties." Martinez (2000:107) offers a detailed analysis of the economic incentives for small-scale warlords in the Mitidja plain, the area south of the capital. Warlords "protected" any merchandise traffic from and to Algiers. Martinez states that "the permanent establishment of armed bands in areas like Cherarba, Baraki and Les Eucalyptus<sup>1</sup> is explained not only by extreme ardour for waging the Jihad, but also by the abundance of financial resources due to the high proportion of petty traders whose business was expanding." He adds that the "main roads filled with vehicles favoured protection rackets and explained the proliferation of fake checkpoints."

I use the proportion of automobiles per person at the wilaya level from the official statistics (ONS 1996-2005) as an indicator of wealth and thus target value at a certain location. The control of wealthier areas is more attractive for both incumbents and insurgents, because taxing well-off individuals is more lucrative. This indicator is unavailable for 2002 and before 1996. I extrapolate it back by using the amount of cars in 1996 as a proxy for the missing data before 1996, and the 2003 number for 2002. The ratio in question varies strongly between provinces, but does not increase or decrease significantly between the years.

*H1: The higher the ratio of cars per capita at a location, the higher its target value. Competi-*

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<sup>1</sup>all southern suburbs of Algiers

*tion for taxation of these areas is higher.*

Population density is an important factor to determine the location of civil war events. A larger population density eases urban insurgency tactics, because attackers can hit, run and merge with the local population. Moreover, if one assumes a constant per-capita propensity to fight, more populous areas have a larger number of recruits to draw from. Finally, I am counting events of violence against humans; it is more difficult to hit someone where no one lives. I proxy population size by the number of people in a square. The data is a composite indicator of population drawn from four grids from 1990 to 2005 from CIESIN 2007. I log-transformed it because the effect of large population concentrations is unlikely linear.

*H2: With higher population density, the probability of events increases.*

To destroy the vulnerable oil infrastructure - in order to deny the government most of its budget and all foreign exchange - was a challenge the armed islamist groups never carried out, a fact which already puzzled Martinez (2000:210). Policing a desert is extremely difficult in theory against appropriate tactics, as Algeria's neighbor Libya had to learn the hard way in the Chadian-Libyan War.

The large distances the rebels would have to cross in order to attack, say, Algeria's main oil hub at Hassi Messaoud, apparently presented a challenge to the insurgency so great that it did not justify the cost. There is only one piece of evidence of successful rebel assaults on the oil infrastructure, excluding sabotage of the pipelines: an assault on May 5, 1995 at Ghardaia on a Bechtel/Sonatrach facility.

I can only speculate why the rebels did not attack this main cash cow of the government. It is usually argued that the oil facilities in the desert were too heavily protected (Lowi 2006) to provide an opportunity, but this blunt argument eludes me. The easier-to-access refining facilities of Jijel and Arzew (Oran) were also not systematically attacked, though Arzew was the location of a foiled sabotage attempt in July 1998.

A convincing argument seems that, since the insurgency had its main focus in the area around Algiers, rebel group's cost in waging a war 800 km from their home base increased even more than it increased for the government, which could use planes for long-range haul, while for rebels, such a long land journey may be very risky.

I thus do not include most of the Sahara in my analysis, partly also because its few outlier events would otherwise have a large impact on my results. I am losing only 0.1% of the events and 74% of the area of Algeria<sup>2</sup>. I exclude the area below the 32. parallel from the analysis.

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<sup>2</sup>Another problem that makes me feel safer excluding this data is possible fabrication of events in the Sahara by the Algerian secret service (see Keenan 2006).

*H3: The Sahara played no significant role in the Algerian civil war, because the government made assaults on it too costly.*

### 1.1.2 Government and Rebel Strength

State strength at a location and a point in time depends on "a combination of allegiance and coercion" (Buhaug 2007). Events will thus occur where state strength approximately equals rebel strength. In this section, I will build an index with which to proxy strength equality, the Strength Equality Condition (SEC). This index will be composed of two parts: factors increasing government strength, and factors increasing rebel strength. I will subtract rebel strength at a certain location from government strength at the same location.

$$SEC_t^j = |\text{Government Strength}_t^j - \text{Rebel Strength}_t^j| \quad (1)$$

With  $j$  and  $t$  defining the location and time of the observation. Rebel strength is subtracted from incumbent (government) strength. If this SEC index is negative, the government is weaker than the insurgents at a certain location and in a certain year. If it is close to zero, both parties' strength is about equal. If it is superior to zero, the government is stronger. In my analysis, I use the absolute value of this index as shown in formula 1 - my thesis is that strength equality of both parties increases the probability of battle events taking place at a certain location and a certain time.

According to Buhaug (2007), the geographic diffusion of both government and rebel power decreases both incumbent and rebel strength, if we are moving away from the capital and the rebel bases, respectively. Power diffusion, according to Buhaug, is affected by "quality of infrastructure, extent of local administrative bodies, rough terrain, and cultural differences".

**Factors increasing government strength.** My RGSi (relative government strength index) is a government strength index relative to initial government strength, the latter measured as government budget in the reference year 1993. It is straightforward and given by:

$$RGSi_t = \frac{\text{Government Revenue}_t}{\text{Government Revenue}_{1993}} \quad (2)$$

The RGSi shows a secular increase from its value of 1 in 1993 to 9.6 in 2005, which is essentially due to increasing hydrocarbon revenue (Table 1).

I consider "cultural differences" insofar as I add a "Kabilya dummy" for the area within the Tizi Ouzou and Bejaia provinces. In any square that intersects with these provinces, government strength is increased by 1. Secular Kabilya did not support the Islamists in the 1991 elections. By

2001, however, Kabilya was in flames because of severe government repression. The area was not supporting the government any more by then, and I remove the strength bonus for Kabilya in the index.

The distance to the capital<sup>3</sup> diffuses government power. This is a rough proxy, but I can use it to predict the extent of local administrative bodies in the highly centralized state of Algeria. Proximity to a main road (road class 1 and 2 in the CIESIN dataset) increase it. Distance to capital is proxied by a decay function of state power away from the capital. The government power at the capital is proxied by the RGSi. The presence of a main road in a square increases government strength by 0.5 points.

The final formula for government strength at a location and during a given year is thus:

$$\text{Government Strength}_t^j = \frac{RGSi_t}{\text{Distance to Capital} + 1} + \text{Kabilya Dummy} + \text{Road in square} \quad (3)$$

**Factors determining rebel strength.** For determining rebel strength in a given year, I develop the RRSI (Relative Rebel Strength Index). This index is more complicated, as I do not have a direct proxy for rebel strength as in the case of the government strength. I assume that the election results of 1992 reflect the real power distribution, with government (FLN) supporters pitted against rebel (FIS) supporters. This is a very strong assumption, and a dissatisfying proxy for a number of reasons, but I have no better<sup>4</sup>.

The FIS got 47.27% of the vote, the FLN 23.38%. The FIS reaped about *twice as many* votes as the FLN (Fontaine 1992, JORA 1-1992). The FIS, thus, is assumed to be about twice as strong as the FLN in my reference year, 1993. I use 1993 as the reference year because the rebels showed organizational structure only as late as winter 1992-93 (Martinez 2000:198). This assumption likely makes me overestimate rebel strength.

In order to track the evolution of rebel support over time, I first assume (see election results) that the rebels were twice as strong as the government in 1993. The index takes the value 2 in 1993.

I then track the percentage of two-sided events in the sample in which the rebels attacked, and use it as a proxy for each year's variation in rebel support. I use as base period the year 1993, in which the government attacked in 87% of battles. The RRSI is given as follows:

$$RRSI_t = 2 * \frac{\text{Fraction of Battles in which the rebels attacked}_t}{\text{Fraction of battles in which the rebels attacked}_{1993}} \quad (4)$$

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<sup>3</sup>In decimal degrees

<sup>4</sup>Recall that most of the FIS' clientele were not 'islamists' but mainly protesters dissatisfied with the FLN.

Using the proportion of battles in which the insurgents attacked as the time-varying element of their strength may prove fallacious. First, one could argue that this proportion is endogenous to government strength: it depends on government strength as well as on rebel strength. A weak government will attack less often in a given year, and the rebels relatively more often. This leads us to overestimate rebel strength in times when the government is weak.

More importantly, however, incumbents have an interest to selectively manipulate available information in order to downplay rebel strength, and there are hints that they have done so in Algeria (Sidhoum 2002-2006). Battles that could have harmed "morale" of the Army and the population, because insurgents were victorious, were likely underreported.

Table 1 shows the evolution over time of the RGSi and the RRSi.

Table 1: RGSi and RRSi for 1993-2005

<b>Year</b>	<b>RGSi</b>	<b>RRSi</b>
1993	1	2
1994	1.36	1.82
1995	1.88	2.01
1996	2.58	2.37
1997	2.89	1.86
1998	2.42	2.07
1999	2.96	2.27
2000	4.93	2.51
2001	4.62	3.18
2002	5.00	2.18
2003	6.08	1.96
2004	6.92	2.04
2005	9.63	1.93

As a proxy of local insurgent support, I add one point to rebel strength if the vote for the FIS at a location (Fontaine 1992, data for each electoral constituency) was above 35%. The vote for the FIS was a protest vote, and urban constituencies voted FIS more extensively<sup>5</sup>.

I coded several rebel "bases" established throughout the conflict based on Taheri 1998 and Martinez 2000: The Meftah and the Chrea mountains (both Blida province) are coded as GIA/GSPC<sup>6</sup>

<sup>5</sup>Fontaine 1992:164. Rural poor areas did usually not vote FIS because of "traditional tribal cleavages".

<sup>6</sup>Armed Islamic Group/Salafist Group for Preaching and Combat - the "urban" guerrillas.

strongholds. The areas around Lakhdaria, Zharbar (Bouira), the Ouarsenis mountains (Tissemsilt), Collo (Skikda), and the Chekfa mountains (Jijel) are considered AIS/MIA<sup>7</sup> strongholds. Rebel strength will be highest at the location of these bases and decay away from them, the distance for the decay function measured in decimal degrees again.

The fact that "vast territories with scattered population hamper effective rule by increasing costs and limiting the efficiency of policing" (Buhaug 2007) is certainly true for the forest-covered mountains of Northern Algeria. The argument of Collier and Hoeffler (2004) is further widely accepted: rough terrain provides cover for insurgents and as such an opportunity for rebels. My proxy for rough terrain is the average spot elevation per square. Higher elevation increases rebel strength<sup>8</sup>. Because mean elevation varies from 0 (coastal squares) to 1820 m, using it "as is" would overpower the government (which, recall, has a maximum strength of 9.6 at the capital in 2005). Thus elevation is divided by 960 in order to increase rebel strength between 0 and 2 points.

Rebel strength is thus given by:

$$\text{Rebel Strength}_t^j = \frac{RRSI_t}{\text{Distance to Base} + 1} + \text{Vote for FIS dummy 0-1} + \frac{\text{Elevation in m}}{960} \quad (5)$$

Table 2: Components of the SEC

<b>Factors composing the Government Strength Index</b>	<b>Factors composing the Rebel Strength Index</b>
Relative Government Strength Index (RGSI)	Relative Rebel Strength Index (RRSI)
Distance to Capital	Distance to Insurgent base
Kabilya Dummy	Average Elevation
Road in Square	Vote for FIS

*H4: Events will occur where government strength approximately equals rebel strength.*

Additionally, those areas in which support recently flipped from rebels to government, and vice versa, will be vulnerable to one-sided events, especially massacres. This occurs because the winner of a newly conquered area (such as the Mitidja plain in 1996-97) has an interest in turning

<sup>7</sup>Islamic Salvation Army/Armed Islamic Movement, the "rural" guerrillas, closer to the ideology of the FIS.

<sup>8</sup>An indicator that shows that this assumption is viable is that the government repeatedly bought helicopters and night-vision equipment in order to overcome its disadvantage in poor terrain.

the population so they become loyal to its cause, and it will likely do this by force. In addition, the population of newly conquered areas will resist its invader for some time after the conquest. Further, clean-up operations will likely take place in these areas.

*H5: Recently conquered areas will host more events.*

### **1.1.3 Polarization**

As stated before, battles are more likely to happen in areas which are polarized between rebel supporters and government supporters. To additionally map this, I created a dataset with the slope of the vote for the FIS (again the valuable data of Fontaine 1992). A high slope indicates that two adjacent constituencies did vote very differently from each other.

*If two neighboring electoral constituencies' support is very different from each other, their border will see a large number of events*

Another indicator of polarization is whether events have already taken place in a given square in the past year; provoked violence against locals will probably incite them to take arms and retaliate. There is repeated evidence in Sidhoum 2002-2006 that especially government militias were difficult to keep under control after insurgent assaults, especially in their retaliation against actual or presumed rebels. Furthermore, Hegre, Ostby and Raleigh (2007:23) note that "events are not independent - an attack by one actor in a location is likely to lead to repeated attempts if unsuccessful, and to retaliations by the other actor if successful". Finally, this accounts for unobserved location-specific factors that make the location more prone to conflict.

*H6: Events at a location in the past year lead to an increase in the number of events in the year immediately following it.*

Urban areas not under threat of the insurgents would consequently be less at risk of violent events. One example is Greater Kabylia, the area east of Algiers, where the electoral outcome and support for the FIS was low; the government was able to recruit militias already early in the war in these territories without fear of moral hazard from the newly armed civilians. There are also several reports in Sidhoum 2002-2006 about government-armed militias working for the insurgents, a fear the government had from early on in the war. (Sidhoum 2003, Yous 2000).

### **1.1.4 External Intervention, Welfare and allocation of government revenue.**

The model is almost certainly underspecified. I have only a very rough proxy for cell wealth and rebel strength. Wealth affects target value, and rebel and incumbent support levels. Rebel strength

is difficult to measure unbiased, and there should be few better proxies than mine in comparable frameworks.

In addition, external actors, especially former colonial power France, had a very complex policy during the Algerian insurgency. A strong commitment to the military, forgiving Algeria its sovereign default in 1993, and strongly supporting the coup that prevented the FIS from coming to power as the first democratically elected Islamist government ever, had a huge impact on the early course of the war. The debtor countries (essentially France) did not claim payment of their debt in 1994, and multilateral lenders even gave further \$ 20-40 billion (DZD 100-200 billion) to the government over 1994/95 (Lowi 2006 (lower estimate), Martinez 2000 (upper estimate)). External intervention is reflected in my RGSi as a sizable portion of government budget, and affects the analysis indirectly.

Martinez (2000:166) confirms the point that the military did not only take the IMF money, but also strongly promoted widespread economic reform: "The ANP as purveyor of economic development and guarantor of democracy? That image aroused derision. Did the military themselves believe in what they were saying? The fact had to be faced, five years after the statement of those ideas, that their promises had been kept." I thus include a "reform dummy" in my regression, which takes the value of 1 for the years from 1995 to 2000, when most economic reforms were carried out. Martinez (2000) is the main proponent of a thesis that the lack of economic reform was the main reason for Chadli's electoral defeat and eventual ousting. But the HCE adopted a range of policies that were interpreted as a credible indicator of reform.

*H7: The economic reforms carried out by the government on behalf of the IMF increased government legitimacy and directly reduced the incentive for rebels to attack the government.*

The government spent its incremental revenue in security and the military at first<sup>9</sup>. After the militias and the counter-insurgency capacity of the military had been built up, the government shifted its focus to social welfare<sup>10</sup>. The job market managed to absorb a very large number of unemployed potential dissenters after 2001, the unemployment rate halving from 30% to 15% in merely four years<sup>11</sup>. Combined with an efficient military deterrent, the incentive to join the insurgency for an employed worker is minimal, while to unemployed youth, a war's loot may provide opportunities of social advancement and wealth.

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<sup>9</sup>under the HCE and under Zeroual. Even though General Zeroual was termed a "dialoguiste" in the press, the military remained a very strong parallel structure to his rule.

<sup>10</sup>One could argue that militia-building is a form of specially targeted "welfare". Groups at risk of joining the insurgency for a livelihood, unemployed young males, are selectively bought off by the government.

<sup>11</sup>The Algerian labor force has grown from 6.5 million to more than 10 million in 1993-2005 (IMF 1998, 2007).

*H8: Growing unemployment increased social unrest, the reduction of it in the later years of the war brought an end to it.*

Absorption of young job-seekers is currently done with the "programme national de soutien a la croissance economique", a massive public works program that currently pumps more than 1 billion DZD per year (four times the government budget in 1992) into the economy, backed by oil money. Such an economic policy is, of course, highly dependent on a high oil rent. It may exacerbate existing corruption and inflation problems, and problems brought about by the decreasing labor productivity (IMF 2007) inherent to this statist type of economic policy. The Algerian government's greatest challenge by now is to switch to a more sustainable and diversified economy. This is bound to be very difficult under the prevailing conditions. The high exchange rate is dictated by the oil prices (Korenchelian 2005), severely affecting comparative advantage in a country that has no competitive export industry to speak of. Building it up, in turn, would require to refrain from flooding the corruption-prone construction sector with indiscriminate oil money (See e.g. Collier 2007, p. 44ff).

## **2 The course and location of the war in Algeria**

### **2.1 The location of the events**

I coded a spatially and temporally disaggregated event variable in the Algerian civil war from news reports. It provides information about the geographic location of the battles covered in the media. In addition to reported clashes between the security forces and the insurgents, I systematically included one-sided violence when it was reported. About three quarters of the reported violent events were one-sided events, and a large number of these were bombs, targeted assassinations and massacres of civilians. They form an important aspect of the logic of the war. Often described as 'wanton' and 'senseless' (Kalyvas 1998:1) they can in fact also be explained empirically and form part of the strategy of both combatants. They serve various purposes. Massacres, for instance, secure allegiance by example. They indirectly threaten the surviving civilian population that the same will happen to them if they do not comply with the perpetrator's desires. The purpose of bombs and targeted assassinations - also one-sided events - is more straightforward. A weaker conflict party that would probably lose a pitched battle with its opponent will use hit-and-run tactics as the most economic method of inflicting damage to the stronger party.

Figure 2 shows the location of all<sup>12</sup> events from 1992 to the end of major hostilities in 2005,

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<sup>12</sup>Unique events drawn from at least one of my four sources detailed below, which featured information about the



events in the war, I could rely on several sources. My main source, however, is the chronology of massacres in Algeria (Sidhoum 2002-2006), which I completed with a large number of newspaper reports<sup>13</sup>. Sidhoum's chronology is the only reliable source by 1997. Before 1997, I could find reports of violent events in *Le Monde* which it did not cover, later on this was not possible. Its own sources include newspapers, both in French and Arabic, and eyewitness accounts. Newspapers were heavily censored from 1994 to 1998, and the eyewitness accounts are mostly from Sidhoum and his collaborators, who lived in Algiers at that time.

I coded a battle if a clash or an ambush between one of the two rough "parties" of the conflict, the insurgent groups and the government, occurred, even if no figure of the amount of people killed was available, or none were killed. I also coded as battle any reported search operation by the Army, or "ratissage". For one-sided events, it was at times difficult to determine whether the event was criminal violence or war related, especially in the case of targeted assassinations.

The sample is likely biased towards populated places, because of two reasons. Firstly, the accounts often state that an event took place "...close to" a certain town as the most exact geographic location available<sup>14</sup>. Secondly, there is likely a structural urban bias that leads to the chronic underreporting of rural events, as stipulated by Kalyvas (2006:38<sup>15</sup>). I have not taken into account this urban bias yet, but the data allows for it, in a variety of ways. I have estimated a model in which remote battle data is multiplied (weighed) by the distance to the capital<sup>16</sup>.

Additionally, the rural dynamics of the war are underreported and poorly understood in the case of Algeria. Violence in rural areas was probably kept under close control of the local authorities, as Martinez (2000:191) remarks. "The murder of a guerrilla or a policeman is the result of a targeted choice, patiently weighed and not supposed to cause any upheaval among the leading people of the village."

I have coded any event from 1992 to December 31, 2005 even though the conflict has been classified as "minor" by CSCW (2006) since 2003 for failing to meet the "war" death toll of

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<sup>13</sup>Le Monde 1992-1998, BBC Online 1998-2004, and El Watan Online 2004-2005. *Le Monde* had no correspondent in Algeria from 1997 onwards.

<sup>14</sup>I have marked cases that did not occur at the exact location at which they are coded in the database according to ACLED (Armed Conflict Location and Event Data, Hegre & Raleigh 2005) rules:

- 1- the event happened at the exact location
- 2-in the vicinity of that location
- 3-in the province (*wilaya*).

<sup>15</sup>"Studies of civil war violence are produced by urban intellectuals despite the fact that most civil conflicts are fought primarily in rural areas by predominantly peasant armies"

<sup>16</sup>for data 1994-1998, and observations that are more than one decimal degree away from the capital

1,000 people per year. The official death toll is 150,000<sup>17</sup> to which one must add massive internal displacement. In other words, out of a population (2006) of just under 33 million<sup>18</sup> (ONS 2007), 0.36% was killed during the course of the conflict. The most violent years, 1997-98, may have seen up to 60 dead per 100,000 population, a war twice as violent as the ongoing Iraq conflict, or about as deadly as the war in Sierra Leone at its height (Human Security Report 2005).

A minor source of error lies in matching names with their geographic location. Due to the transliteration from Arabic to English in the namefile (NGA 2006) and from Arabic to phonetic French in the news reports, the names of the places where the events occurred did not always match exactly. I tried to match these places with similar spellings or, all else failing, I reported only the province.

## **2.2 Probable bias in the dependent variable**

Roberts (2003:160) refers to 35,000 dead until 1996 in an article written in 1997 under the impression of the estimates of that time. The most frequently used estimation of the death toll up to 1998 is 100,000, first put on the table in a speech from President Abdelaziz Bouteflika in Crans-Montana on June 26, 1999 (Sidhoum et al. 2002). According to these figures, assuming about 200 dead per month in 1992-93, the death toll must have increased to about 850 per month until the end of 1996 and to about 2,500 per month in 1997-98, and then decreased abruptly to 200 per month in the period 1999-2003 (yellow line in figure 3). Both the 850 and the 2,500 figure are not realistic. They imply a massive increase and subsequent decrease in scale that my event data cannot confirm empirically; my events confirm 17,053 killed only for 1992-98. If I assume that the gap between the recorded events and the official figures is a proxy for the missing battle data, about 120 events per month in 1994-96 (out of 140) and 400 in 1997-98 (out of 450) must have gone unreported.

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<sup>17</sup>Bouteflika 2005: Speech on February 25. This estimate is probably inflated, see next section

<sup>18</sup>Population growth was very large in the conflict period: in 1992, the Algerian population numbered about 25 million.

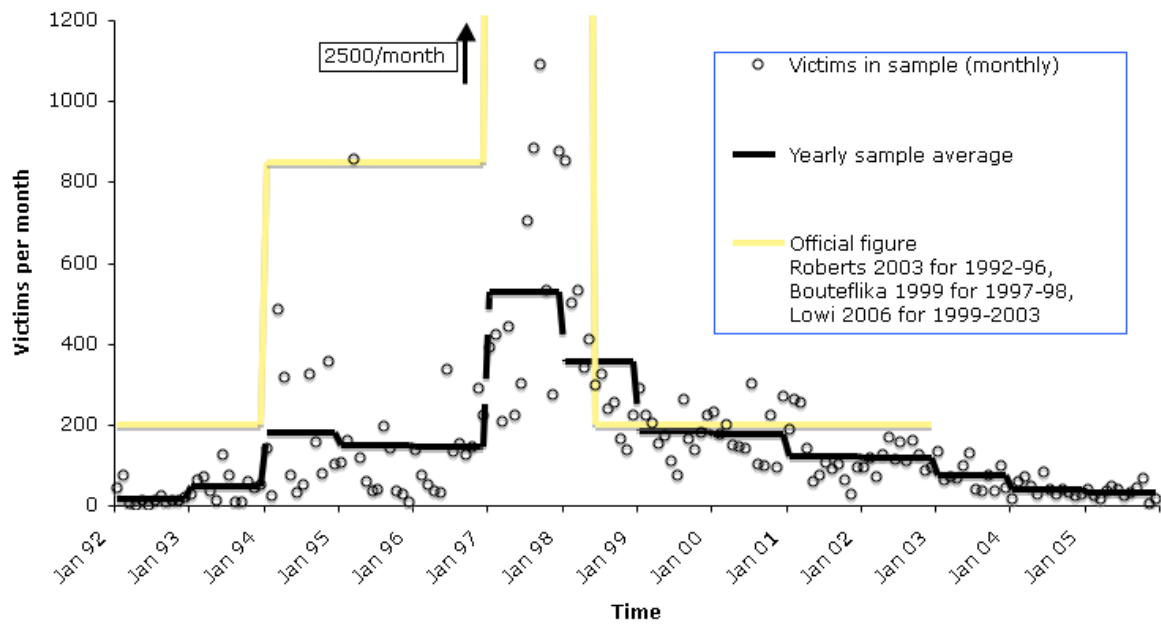


Figure 3: Sample death toll vs. official death toll, monthly.

This point is critical for my work, for if I missed more than 80% of the events prior to 1998, I must expect the sample not to represent the Algerian civil war accurately. I will partially correct for that bias in Model 3.

## 2.3 The models

My models analyze several different aspects of the war, they intend to explain one-sided violence and two-sided events. Model 1 uses as its dependent variable the cumulative number of two-sided events (battles,  $ba$ ) in a given square-year.

I use negative binomial regression for all models. The standard error is stated in brackets below the coefficient. Negative binomial regression corrects for the fact that events are not independent from each other (Hegre, Ostby and Raleigh 2007). This is also consistent with hypothesis 6.

Model 2 analyzes one-sided events ( $os$ ) separately. Its dependent variable is the amount of one-sided events in a certain square-year.

Model 3 corrects for the urban bias. The dependent variable is the number of battles in a given square-year ( $ba$ ) multiplied by the distance to the capital ( $di$ ) in decimal degrees<sup>19</sup>. Events that are

<sup>19</sup>if the distance to the capital is superior to one decimal degree.

further away (at most 5.45 degrees) thus get more weight. I estimate this model because I assume underreporting of events is stronger the further away from the capital these events took place.

Model 4 regresses only the two single most significant explanatory variables, population and past events, with my battle (two- sided) data.

Table 3: Estimation Results

	<b>Model 1 (ba)</b>	<b>Model 2 (os)</b>	<b>Model 3 (ba*di)</b>	<b>Model 4 (ba)</b>
Population in square (ln)	0.853*** (0.327)	0.862*** (0.022)	0.805*** (0.031)	0.898*** (0.031)
Cars per inhabitant	8.972*** (1.169)	11.237*** (0.852)	14.576*** (1.613)	
Absolute value of SEC	-0.146*** (0.048)	-0.186*** (0.034)	-0.230*** (0.058)	
Previous change of square owner	0.034 (0.099)	0.089 (0.073)	-0.191 (0.120)	
Slope of vote for FIS in 1991	-0.005*** (0.001)	-0.003*** (0.001)	-0.002** (0.001)	
Number of events in the past year	0.506*** (0.022)	0.671*** (0.022)	0.789*** (0.051)	0.558*** (0.023)
Reform Dummy (1 for 1995-2000)	-0.317*** (0.101)	0.030 (0.072)	-0.234** (0.083)	
Unemployment	4.700*** (1.212)	7.994*** (0.941)	3.962*** (1.317)	
Constant	-12.943*** (0.397)	-13.261*** (0.296)	-12.129*** (0.402)	-11.993*** (0.283)
Pseudo-R2	0.2742	0.2607	0.1383	0.2659
N	75283	75283	75283	75283

Numbers in brackets are standard errors. \*\*\* denotes 1%-significance, \*\* 5%-significance and \* 10%-significance.

### 3 Results

Model 1 pits battles against their covariates. Most results are as expected - a larger population, higher wealth increases the probability of a battle at a certain location. A distinctive policy implication can be made from the implication of this within-country greed effect. Aid, or other fungible locally administered increases in wealth, will make the area in question richer, and as such more prone to looting. Increasing wealth of a particular location during an ongoing conflict equates with luring looters toward the area in question, and is thus counterproductive for local people.

A large number of past events also increase battle probability. Strength equality has a negative impact on the event count of a cell. As theorized, battles are less probable if one side is much stronger.

The "previous change in square owner" variable is insignificant. Squares that have recently changed hands are neither safer nor more at risk of both battles and one-sided events.

Higher polarization (slope of vote for the FIS in 1991) reduces the event probability at a certain location, but the effect is very small. This variable's analysis is also very complicated, as it is not normally distributed: 50% of squares have zero slope and the rest have a (nearly normally distributed) slope comprised between 60 and 88.29. The variable's coefficient is not very robust either (Model 3). This may either mean that polarization on a local level does not increase the probability of events or that my indicator is imperfect. High polarization is often observed at province boundaries, which may be strategically insignificant due to their remoteness.

High unemployment in a given year (recall that there is no geographic variation in this variable) increases the amount of civil war events, as expected. The effect is especially large for one-sided events (model 2). The government was thus right in arming and financing militias in the first years of the insurgency, thus making potential dissenters dependent on it<sup>20</sup>.

In Model 2, the results remain similar. The reform dummy is now significant, indeed, more one-sided events happened during the adjustment years. This is probably a direct effect of adjustment, and not merely an adaptation of rebel strategy, shifting from all-out battles to bombs because they needed to preserve human resources. After 2000, rebels had even less human resources at their disposal, but the war shifted back towards more two-sided events (battles). Recall, however, that there is bias in the data. That is, battle information was suppressed in the press, while one-sided event information was not.

Further, one-sided events are even more frequent than battles where the insurgents were about

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<sup>20</sup>This also caused a number of problems, newspaper reports from 2001 onwards show that many roadblocks were operated by criminal militia members disguised as "Islamists" (Sidhoum 2002-2006)

as strong as the rebels. This is consistent with the well-known hypothesis of the "security dilemma" as stated in Kalyvas (2006:72). Where one cannot be sure whether the locals are loyal, the easiest way to signal that disobedience can be costly is through spreading fear.

Model 4 is also interesting. Population in square and the number of events in the last year alone have nearly as much explanatory power as the full model. This indicates that the scope for interventions into the course of the war (e.g. an investment into local strength superiority or strongly weakening the economic base of the insurgents as measured by the wealth index) is probably not high.

## 4 Conclusion

The course of violence in the Algerian Conflict can be explained easily with a "greed and grievance" framework; and "wanton" violence is actually often rational (Kalyvas 1998). In Algeria, party-political polarization did probably not influence the violence once it had started, but the government was able to control violence when it had overcome its deep financial crisis. The impact of the exogenous increase in oil prices provided 25 times more incremental funding to the government by 2005 than the IMF adjustment loans, thus probably benefiting the government much more, while the cost of immediate adjustment was to plunge the country deeper into chaos.

The following table illustrates the slow gain of strength of the government over the rebels. The number of cells that flipped either to the government or to the rebels in a given year, according to the SEC model, is shown. In 1992, and again in 2005, the government owned all 5815 grid cells I use in the analysis.

Table 4 shows that the war was far from won by the government until 2002. Beforehand, the rebels had most of the population and resources in their hands. The main government asset through the whole conflict was the oil wealth, without it, the war would have lingered on much longer. Whether the government would have fallen without the hydrocarbon rent can only be the subject of speculation. But the fact that it managed to remain afloat in the critical years in which the oil prices were low seem to support the view that it would have unlikely fallen. Another case in point is whether the incentive for the old military elite to remain in the power seat would have been as high without the wealth derived from the oil rent.

Finally, the insight into within-war dynamics of violence that this paper provides is useful for predicting the course of events of other civil wars, and to provide information for policy makers interested in ending those. Another result of this analysis is that, in the short term, economic and political transition is less risky in times of high state strength. I however acknowledge that for

Table 4: Cell flips to the government and the rebels

<b>Year</b>	<b>Government to Rebels</b>	<b>Rebels to Government</b>
1993	5726	0
1994	0	27
1995	0	19
1996	0	23
1997	0	133
1998	113	0
1999	0	45
2000	0	827
2001	690	0
2002	0	913
2003	0	887
2004	0	541
2005	0	1648

petrostates like Algeria, the incentive for the elites to cling to power and oil rent is high in times where this rent is large.

Within countries, a government that wants to retain control can for example increase its relative strength where rebel support is high. Small increases in relative strength at a location reduce violence very significantly. This is probably best done by improvements of the infrastructure. The effect of buying off young potential rebels is ambiguous; as we have seen, richer areas are more at risk of conflict. However, government incentives for remaining loyal seem to have worked in the case of Algeria between 1997 and 2005. The IMF (2007b:21) argues that, as of 2005, "although public sector employment is falling, government spending remains the main engine of employment creation."

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