

The Political Economy of Riot-type Violence in Developing

Countries: A Case Study¹

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Abstract

We have argued that ‘small-scale violence’, which is often the type of violence most frequently occasioned by episodes of economic crisis, is different from the kind of violence most frequently modelled by economists, namely civil war – it is shorter-term, more localised, more reactive rather than initiatory in nature, and much more than civil war it is a reflection of short-term political variables, in particular the credibility of government and the politicisation of the opposition. We simulate these factors through the use of a model in which income can be derived from two different sorts of endowments, one of which is contestable and exogenous and the other is endogenously determined within the model. In the empirical estimations, indicators of the politicisation of the opposition, of the public’s mistrust of government, as well indicators of unemployment and inequality, emerge as significantly related to the likelihood of violence of this type.

Keywords: conflict, violence, crisis, poverty

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1. Introduction

The causes and consequences of civil conflict have been the focus for an important part of the literature of development economics in recent years. Not only has it become clear (with particular reference to Africa) that conflict is a major cause of underdevelopment and long-term poverty (Collier, 2007), but in addition the analysis of the causes of conflict has begun to yield to economic as well as political analysis. Although the ‘greed versus grievance’ controversy concerning the causes of civil conflict is by no means resolved, nonetheless it has become clear that economic or ‘greed’ factors, in the shape of high benefits or low costs associated by potential aggressors with involvement in initiating conflict, have an important part to play in the explanation of the causes of war, and therefore of the economic damage caused by it (Collier and Hoeffler 1998, 2004; Hirshleifer, 2000; Nafziger et al., 2000).

However, the form of conflict analysed by this literature has consisted almost entirely of full-scale civil war. The type of conflict associated with street demonstrations, riots, roadblocks and industrial violence in developing countries, although a universal part of the political landscape of developing countries and often the subject of case studies by political scientists and historians, has been little examined in quantitative and comparative terms by economists, even though it is much commoner than civil war, and even though in its own right it may cause major damage to development prospects via its impacts on investment and growth, poverty and, often, governability³. It is the causal processes underlying the initiation of low- level conflict of this sort which constitute the principal focus of this paper. Although ‘riot-type

³ Empirical cases where riot-type conflict originally has escalated into an overall breakdown of civil order include Sierra Leone in the 1980s, Bolivia in 2003 (in each case deriving from a failed stabilisation programme) and Ethiopia in 2005 (deriving rather from the coincidence of a rigged election and drought-related shocks). The consequences of macro-economic adjustment for conflict in general, not just for the type of riot-type conflict examined here, are analysed by Nafziger and Auvinen (2003). They find that participation in IMF programmes has a significant positive impact on the level of deaths in civil conflict.

violence' has been little examined in quantitative terms, there do exist many valuable materials on riot-type violence which serve as a point of departure for this study. First, there is the study of political feasibility of adjustment conducted by the OECD (Haggard et al., 1996). This pioneering study was the first to collect data on strikes and demonstrations and to examine their relationship, drawing on two empirical papers on Latin America by Paldam (1993) and on Africa by Morrisson et al. (1993), which is based on data running from 1980 to 1991⁴. Secondly, various studies of the incidence of industrial conflict have been conducted in relation mainly to industrialised countries. Thirdly, a number of individualised country-level case studies of 'low-level' political violence' exist, including some conducted under the auspices of the present project. From these studies, the following contrasts between riot-type political violence and civil war immediately emerge:

a) Riot-type violence is more short-term. Typically episodes of rioting only last a day or two, although industrial disputes may carry on for a much longer time. By contrast, civil wars often go on for years. As the OECD report notes, (Haggard et al., 1995; 80) low-level conflicts 'over time,.. become increasingly difficult to sustain because of the growing costs to participants'.

⁴ The two constituent studies use somewhat different methodologies. The study by Paldam (1993) compares nine Latin American balance-of-payments crises between 1980 and 1991 (Chile, Argentina, Bolivia, , and examines their consequences in terms of strikes and demonstrations, finding that protests on average reach a peak about a year after the onset of adjustment, and they are more lively under democratic than under authoritarian regimes. The study by Morrisson et al. (1993), confronted by more severe data problems, constructed a pooled database over the period 1980-90 for 23 African countries. Both industrial strikes and demonstrations are found to be correlated with measures of the intensity of adjustment (this time with a six-month lag – Haggard et al., 1996; 89). The authors of this study also note that the policy-mix is relevant – for example, cuts in recurrent government expenditure are correlated with protest, but cuts in public investment expenditure are not (Haggard et al., 1996; 89). Where (more often than not, especially in authoritarian regimes) these protests are met with politically repressive measures (arrests without trial, etc), these repressive measures are typically short-term, and as they are loosened, typically economic policy is loosened as well, with tax cuts, increases in subsidies and expansion of the money supply to accommodate these (Haggard et al., 1996; 91).

b) Riot-term violence is more localised. Whereas civil wars often cover an entire country, episodes of rioting are typically confined to a few, mainly urban, locations, in many cases within one city only. Within Bolivia, as discussed in Mosley (2007), this was typically the city of Cochabamba, or even more often the satellite city of El Alto above La Paz. In this context, whereas with civil war it is the behaviour of *national-level* institutions for management and resolution of social tensions which is relevant to determining the outbreak and persistence of conflict, with riot-type violence it is the capacity and behaviour of those tension-managing institutions (police, courts, ombudsmen/civil rights officials, channels of communication with local government) at *local* level which are relevant.

c) Riot-type violence is 'reactive' rather than planned. Whereas civil wars can be seen as pre-emptively *planned in advance* by a coherent rebel group, riots are often an ex-post response to an identifiable 'trigger' or provocation (this may, as in the case of the proposed income tax increases in Bolivia in February 2003, be a component of an IMF programme, but it is often something totally separate, as with the arrests of May 2005 in Addis Ababa, Ethiopia). These triggers also, therefore, need to enter into the modelling of short-term political protest violence.

d) Riot-type violence is much more than civil war, is a direct reflection of the credibility of government, and the politicisation of the opposition – the act of rioting is destructive rather than constructive. In Bolivia after 2000 (Mosley, 2007) violent political protests emerged from the discrediting of the merry-go-round of the three traditional parties, and from the increasing conviction of the Aymara/Quechua political parties, and groups associated with them, that intra-parliamentary action was insufficient to achieve social justice, and that collective organisations articulating the

interests of particular economic or ethnic groups (such as the trade union confederation the COB - *Central Obrera Boliviana* and neighbourhood groups within El Alto) needed additionally to be mobilised for this purpose.

For these reasons, we are convinced that although the approach of treating violence as rational behaviour is valuable and carries across to the situation of riot-type violence as well as civil war, it needs to be modelled in a quite different way from the standard models of ‘rational engagement in civil war’ established by the writers cited above, taking note of its short-term, localised and reactive character, and embodying both the politicisation of those seeking to organise the rioters and the capacity of the institutions seeking to achieve social *detente*.

The structure of this paper is as follows. In Section 3, we sketch out a model of this type. In the next section, we introduce our empirical methodology. This is tested in Section 5 against data for Bolivia – in the country in which not only has riot-type violence been an important influence on the macro-economy, but most unusually. Section 6 summarizes the paper’s conclusions.

2. Background

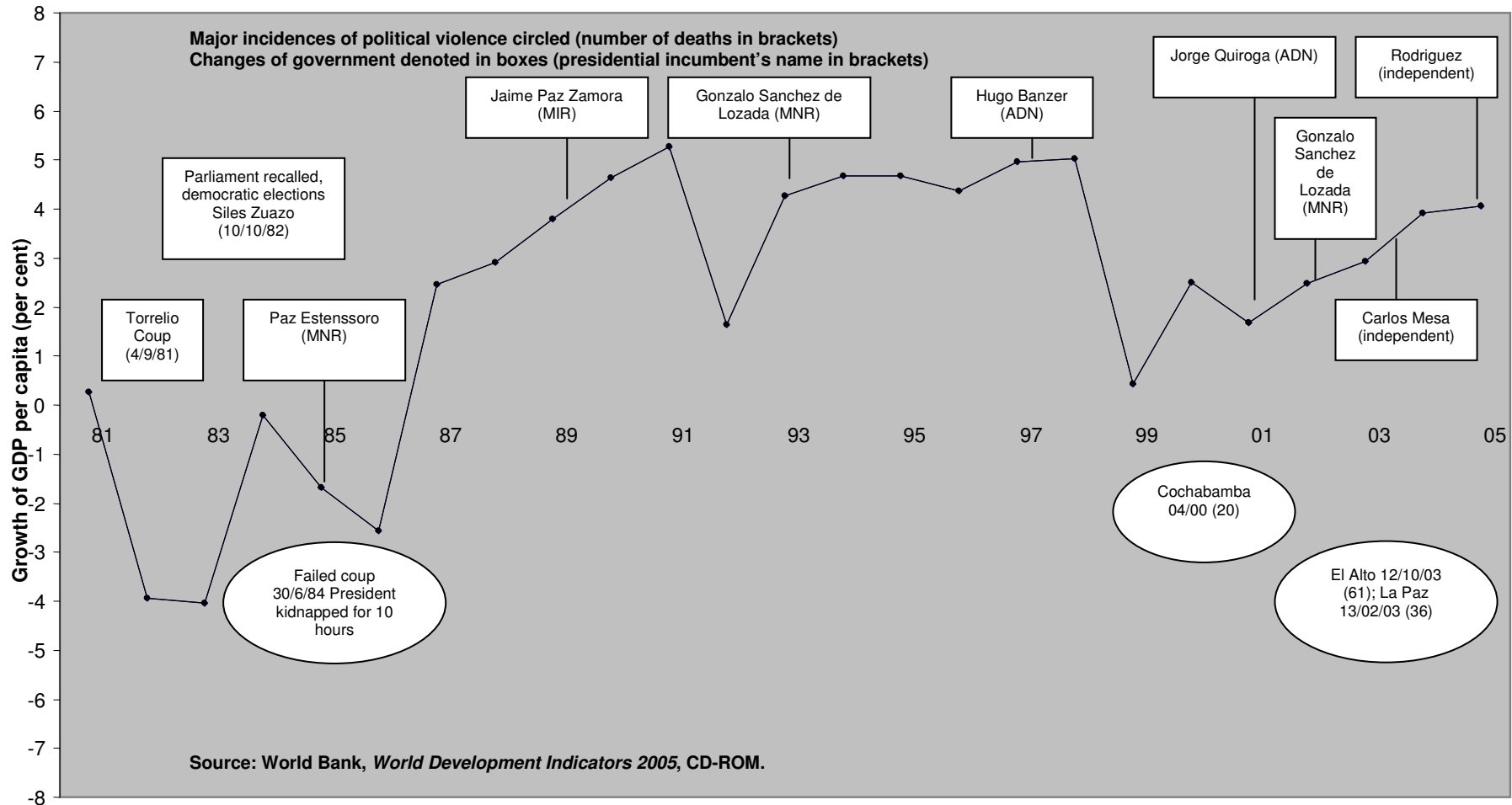
Our case-study country, Bolivia, experienced substantial outbreaks of political violence during the global financial crisis of the late 1990s, which depressed investment and growth and exacerbated poverty, for an extended period. Bolivia is low middle-income country (per capita income approximately \$1,000 p.a.) with a dominant hydrocarbons sector. Substantial ethnic dimension exists, and political violence is concentrated in urban areas. There were IMF adjustment programmes, and

the sufferings of the crisis period were in the opinion of many political actors aggravated by the particular instruments of adjustment recommended by the IMF (see Mosley, 2007), and the imperfections of the democratic process, around the time of the crisis, included severe corruption and inadequate ‘institutions of conflict management’, as we have characterised them (courts and institutions for protection of civil rights such as the Defensor(a) del Publico). There are, however, important systemic differences between Bolivia and other countries, which our model attempts to capture. The ‘policy mistake’ triggers for the worst violence were different in Bolivia from other countries. In Indonesia in 1997, for example, the trigger was an increase in the price of the basic food, rice, whereas in Bolivia in 2003 it was first a proposed extension of the income tax net to the lower middle class (February 2003), and subsequently a proposal to export natural gas through Chile (October 2003)⁵; the Indonesian violence, unlike the Bolivian, had a religious component; and in Bolivia, unlike Indonesia, the location of hydrocarbon deposits in the richer (southern) parts of the country adds a regional dimension which has no parallel in Indonesia.

There were during the period examined two episodes of severe riot-type violence in Bolivia (1981-85 and 2000-05). Both were associated with economic crisis, and with periods of broader instability in the sense of rapid turnover of governments (Figure 1).

⁵ In October 2003, the general strike continued for 30 days. Acute phase, with deaths, lasted for 3 days. Geographical scope: most often El Alto and Cochabamba. Instigator: COB (Bolivian Trade Union Confederation).

Figure 1. Bolivia: Growth of GDP per capita in relation to elections and incidents of political violence



3. The model

We may take as a point of departure the Collier and Hoeffler model (1998, 2004) of ‘rational conflict’ in which individuals take a decision on whether or not to rebel against the government, based on their perception of whether the costs exceed the benefits. The benefits consist of the greater power and higher standards of living which will be derived from subverting the government, which are less the lower the individual’s initial income and education and are higher the larger the tax base which can be taken over, weighted by the probability of success of revolt; the costs consist of the costs of coordinating the revolt and of income foregone if the revolt is unsuccessful.

Our modelling differs in three ways from that of Collier and Hoeffler. In the first place, we eliminate the terms in tax ratio and population size from the Collier-Hoeffler model: riot-type actions typically do not have as their function the taking over of the apparatus of the state, but are localised events with more limited objectives responding often to localised triggers. Secondly, unlike Collier and Hoeffler we include the triggers themselves in the model. We conceive these triggers as operating, as per the discussion above, both at national and at local level. The probability that a given trigger will detonate depends both on whether the explosive⁶ (such as pre-existing levels of vertical and horizontal inequality) is present, and also on whether anybody lights the fuse – in other words on whether government’s actions in face of a crisis (in particular the economic policy mix, and the restraint shown by the forces of civil order), are perceived positively or negatively, and whether there exist forces

⁶ The explosive consists of past grievances which do not have economic roots. There is a large controversy in the literature between ‘greed’ and ‘grievance’ explanations of civil war. In their later paper on civil war, Collier and Hoeffler (2004) argue that grievance factors do not provide a convincing explanation of civil war.

capable of politicising the grievances of those whose perception is negative. These are much more complex factors than Collier and Hoeffler's 'costs of coordination' variable, since what is at issue is not just the material cost of rioting against the existing regime, but whether the government is perceived as acting in good faith to overcome an adverse environment, and how effective is the organisation of those committed to the cause of protest.

A third area in which we depart from the approach of Collier and Hoeffler consists in examining the capacity of institutions for the management of conflict as a determinant of conflict at local level. Some of the institutions which are relevant to the incidence of local-level conflict are, of course, state institutions (military, police, courts, ombudsmen and other state institutions for the protection of civil rights, etc) but others are non-governmental organisations, whose orientation may be crucial in igniting or restraining conflict.

Thus what is going on is a game between rioters and government, mediated by institutions of conflict management some of which, but not all, are within the government sector. In modelling the game we follow quite closely the approach of Evia, Laserna, and Skaperdas (2007). However, by contrast with the approach of Evia et al. (2007) the outcome of the game depends on the politicisation of the opposition and the capacity of institutions for managing conflict as well as simply 'coordination costs' (Mosley, 2007 for the El Alto case).

In a more accurate picture of the world, the following additional things enter into the story:

a) Feedbacks: because riot-type violence depresses economic performance and threatens political stability (as per Grugel et al., 2007).

b) Instability: because especially if government is weak, there is a risk that this may lead to a ‘political business cycle’ in which fears of losing support lead to policy reversal, and this causes IMF etc. support to be withdrawn, leading certainly to economic instability and possibly to political instability as well.

c) Long-term impacts of instability: risk rating, hence investment, hence growth and (ceteris paribus) poverty are aggravated.

d) Long-term consequences: riots depress external (e.g. Bank of England) risk rating, hence investment, hence growth, hence ceteris paribus, increase poverty (as seen in existing Bolivia model).

We now derive the reduced form of the model as a basis for empirical work. Our model visualizes a conflict between two organized groups, A and B , each as a unitary actor. Again, income can be derived from two different types of endowments: one that is contestable and exogenous and another is endogenously generated. Let each group initially possess T units of the contestable endowment and have Y units of the secure endowment. Then, in the absence of any conflict or governance costs, the gross value (R) of each group’s endowment is measured as $(T + Y)$.

The parts of the government’s budget that consist of transfers to each group and which can be fought over in the future can be considered part of this category of income. That is, to keep our analysis simple, we include in T all the economic

resources, including those of the government's budget, that the two groups can be expected to fight over.

The nature and costliness of fighting over the contestable part of each group's income will be examined in detail next. Broadly, the two groups make the following two sets of decisions:

1. The level of government protection of each group's contestable income is determined by past and current taxation and other decisions.
2. Taken the level of protection as given, each group engages in appropriative activities that determine each group's final allocation and income.

That is, we consider a setting in which both governance and conflict are costly economic activities. We begin with the analysis of the second stage of appropriation and conflict.

Conflict

Each group, A and B , faces the strategic choice of whether to engage in appropriative activities in order to defend its own contestable income, T , or to challenge that of its adversary. Let a_{ij} denote the level of appropriation that group i engages in relation to the contestable income of group j . Note that if $j = i$, then this is the level of appropriative activity in defending own income and if $j \neq i$, then this is the challenging level of appropriation against i 's adversary.

Appropriative activities determine the probability of winning or, equivalently, the share of each contested income ⁷ in the following fashion:

$$p_{ii}(a_{ii}, a_{ij}) = \frac{\phi a_{ii}^m}{\phi a_{ii}^m + (1-\phi) a_{ij}^m} \quad (m \in (0,1]) \quad (1)$$

$$p_{ij}(a_{ii}, a_{ij}) = \frac{(1-\phi) a_{ij}^m}{\phi a_{ii}^m + (1-\phi) a_{ij}^m} \quad i \neq j \text{ and } \phi \in [\frac{1}{2}, 1] \quad (2)$$

where $p_{ii}(a_{ii}, a_{ij})$ is the share of its contested income the defending group i keeps, $p_{ij}(a_{ii}, a_{ij})$ is the attacker's share of the defender's contested income, ϕ is the security of property rights. Such functions, commonly called contest success functions, have been used in many different areas of economics, including in rent-seeking, political campaigning, lobbying as well as in the economics of conflict.

The critical parameter that determines the security of property rights is ϕ . The closer to 1 is ϕ , the more secure the property rights of the defender are, whereas the closer the value of that parameter is to 1/2, the more insecure property rights are with the limiting case of $\phi = 1/2$ being one in which there is no advantage to being a defender relative to the challenger. For our purposes here, we can broadly think of ϕ as being determined by the strength of the courts, the state agencies and bureaucracies, and the political apparatus of the country as a whole. How easy is it for the holder of the (uncertain) property right to argue against the challenger in front of a court, bureaucrats, politicians, or the public at large so as to convince such audiences that the defender is right and not the challenger? The closer ϕ is to 1, the easier it is for the defender and the more difficult it is for the challenger to do so. Also, the more

⁷ Probabilities of winning and shares are equivalent under risk neutrality and divisibility of incomes. For exposition purposes, we will employ the share interpretation in the remainder of this paper.

professional are the courts and the bureaucracy, and the greater are the checks and balances in politics, the closer would ϕ be to 1.

Another parameter of interest is m . It can be thought of as a measure of the ease or *effectiveness* of producing appropriative effort.⁸ Working directly through the political process and the state (the courts, the bureaucracy, or the halls of parliament) would entail a lower m to fighting it out in the streets or even in the court of public opinion.

In this subsection we take ϕ as well as m as given. Given the level of security, the payoff functions of the two groups are the following:

$$V_A^c(a) = \frac{\phi a_{AA}^m}{\phi a_{AA}^m + (1-\phi)a_{AB}^m} T + \frac{(1-\phi)a_{BA}^m}{\phi a_{BB}^m + (1-\phi)a_{BA}^m} T + Y - a_{AA} - a_{BA} \quad (3)$$

$$V_B^c(a) = \frac{(1-\phi)a_{AB}^m}{\phi a_{AA}^m + (1-\phi)a_{AB}^m} T + \frac{\phi a_{BB}^m}{\phi a_{BB}^m + (1-\phi)a_{BA}^m} T + Y - a_{AB} - a_{BB} \quad (4)$$

where $a = (a_{AA}, a_{BA}, a_{BB}, a_{AB})$ are the strategies of the two groups, one each for defense of own endowment and challenge of the other group's endowment.

Given the sharing functions and the identical endowments that the two groups have, it can be shown that the (Nash) equilibrium levels of appropriation are identical for defense and challenge and across the two groups:⁹

$$a_{AA}^* = a_{BA}^* = a_{BB}^* = a_{AB}^* = \phi(1-\phi)mT \quad (5)$$

⁸ Note that m is the elasticity of the "impact" function a^m ; that is, $m = \frac{\partial a^m}{\partial a} / \frac{a^m}{a}$.

⁹ If endowments for the two groups were different, the levels of appropriation would be higher for the endowment that is higher but the levels of the defense and challenge would still be identical.

Note that the closer ϕ is to 1 (that is, the better governance is), the lower is the level of appropriation ($\phi(1-\phi)$ is minimized at 1 reaches its maximum at 1/2). Each group keeps a ϕ fraction of its own contested endowment and receives a $1-\phi$ fraction of its adversary's contested endowment. Given the level of security, the equilibrium payoff of each group equals:

$$\begin{aligned} V_i^c \equiv V_i^c(a^*) &= \phi pT + (1-\phi)T + R - 2\phi(1-\phi)mT = [1 - 2\phi(1-\phi)m]T + R \\ &= \sigma T + R \text{ where } \sigma \equiv 1 - 2\phi(1-\phi)m \end{aligned} \quad (6)$$

As can be expected the lower is the level of protection ϕ , the lower is the equilibrium payoff of each group. Note how, with security given, changes in the value of the endowment T (for example, by the discovery of new tradable resources, the exhaustion of old ones, or the change in the international price of existing resources) lead to monotonic changes in appropriation and in equilibrium payoffs. In particular, for fixed levels of security, a reduction in T reduced appropriation and increases equilibrium payoff. We next examine how security can be determined by current and past conditions in stage 1 of the two-stage process we have outlined above.

Endogenous Governance

The level of ϕ (as well as of m) and, therefore, the fraction σ of the contestable endowment that each group eventually keeps would in general depend on the societal and political norms, but more importantly for the case of modern, anonymous property rights on the country's political development and the fiscal choices and organizational decisions that have been made in the past as well as those made in the present. Many of these choices can be expected to depend on the country's

characteristics and, as a first approximation, its current conditions can be considered both similar to those in the past and, to the extent that the conditions might have changed, current conditions can be expected to have considerable influence on current governance. In particular, the resources available for paying and training judges, civil servants, or the police can have an immediate impact on the quality of governance and property rights. These resources are largely determined by the taxing ability of the state, which could in turn greatly depend on the ability of the two contending groups to agree on taxation. Past decisions on taxation also have impact on the quality of governance through the educational level of not just government employees but also of others in the country (lawyers, politicians, engineers, citizens in general) and through other collective-good investments from court buildings to university budgets.

Thus, we consider the level of security to be a function of past and present investments on governance so that:

$$\sigma = \sigma(g_o + g_A + g_B) \tag{7}$$

where g_o denotes the inherited investments in governance and g_A and g_B are the current contributions to governance by the two groups. We suppose security is strictly increasing in its argument ($\sigma' > 0$) at a decreasing rate ($\sigma'' < 0$).

How the level of governance expenditures – which we suppose to equal total taxes – is determined is of course an important issue. Security here is a public good and in the provision of public goods through taxation, there are two focal regimes: one in which public good provision maximizes total welfare and the other in which its provision is non-cooperative and generally inefficient. We shall examine both types of provision regimes and discuss their implications and their relation to Bolivia.

The welfare-maximizing choice of governance expenditures solves the following problem:

$$\max_{g_A+g_B} V_A^c + V_B^c - g_A - g_B = 2\sigma(g_o + g_A + g_B)T + 2Y - g_A - g_B \quad (8)$$

Under the condition that the optimum is interior, or that the inherited level of governance is not too high and there are no liquidity constraints,¹⁰ the welfare-maximizing level of governance expenditures satisfies the following first-order-condition for a maximum:

$$2\sigma'(g_o + \hat{g}_A + \hat{g}_B)T - 1 = 0 \quad (9)$$

It is clear that total optimal expenditure $\hat{g}_A + \hat{g}_B$ can be distributed in many different ways between the two groups (and that in itself can be a source of contention that makes optimal provision difficult to implement). It is clear that $\hat{g}_A + \hat{g}_B$ is positively related to the value of the contested resource T and inversely related to the inherited investments in governance g_o .

The non-cooperative contributions to governance are determined as the Nash equilibrium of the game with the following payoff functions:

$$V_A(g_A, g_B) = \sigma(g_o + g_A + g_B)T + Y - g_A \quad (10)$$

$$V_B(g_A, g_B) = \sigma(g_o + g_A + g_B)T + Y - g_B \quad (11)$$

¹⁰ In practice, especially for low-income countries like Bolivia, we can expect the liquidity constraints to be more likely to be binding, especially for the case of welfare-maximizing provision.

It is straightforward to show that the equilibrium is characterized by the same condition for both groups (and also results in determining only the total and not the particular distribution of expenditures between the two groups):

$$\sigma'(g_o + g_A^* + g_B^*)T - 1 = 0 \quad (12)$$

As in the case of optimal expenditures, Nash equilibrium expenditures are positively related to T and inversely related to inherited investments in governance g_o . Given the strict concavity of $\sigma(\cdot)$, expenditures in governance under the Nash equilibrium are lower than optimal expenditures ($g_A^* + g_B^* < \hat{g}_A + \hat{g}_B$), for, under Nash equilibrium, each group only cares about its own welfare and no weight is put on the adversary's payoff.

We are particularly interested on the effect of a reduction in the terms of trade (a reduction in T) on the levels of security and appropriation. The reason is that volatility and significant reductions in the price of Bolivia's major exports – from silver early in its history to tin during the 1980s – could have been important for government stability, security of property rights, and the level of socio-political conflict, with all affecting directly and indirectly economic performance. That is, the external shock of a price reduction in exportable could have had effects on income that go far beyond the direct effect of the price reduction itself.

Considering the case of the non-cooperative provision of security, where $\sigma^* \equiv \sigma(g_o + g_A^* + g_B^*)$, and noting from (5) that $\alpha_{ii}^* = \phi(1 - \phi)mT = \frac{1 - \sigma^*}{2}T$, the overall

effect of the value of the contestable endowment on equilibrium appropriation can be shown to be the following:

$$\frac{\partial a_{ii}^*}{\partial T} = \frac{(\sigma^{*'})^2}{2\sigma^{*''}} + \frac{1-\sigma^*}{2} \quad (13)$$

The first term is negative since $\sigma'' < 0$, whereas the second term is positive.

The first term is negative because it reflects the effect on appropriation via governance - a reduction in T reduces governance and security and increases appropriation (that is, $\phi(1-\phi)m$ increases as a result of a reduction in governance expenditures). The second effect is positive because it is the direct effect on appropriation. Overall, the effect of the value of T on equilibrium appropriation is ambiguous. If the governance effect (first term) dominates the total effect is negative; if the direct, value-of-prize effect dominates the total effect is positive.

$$\frac{(\sigma^{*'})^2}{\sigma^{*''}} + 1 - \sigma^* < 0 \quad (14)$$

or when

$$-\frac{\sigma^{*''}}{\sigma^{*'}} > \frac{\sigma^{*'}}{1-\sigma^*} \quad (15)$$

which occurs when $-\frac{\sigma^{*''}}{\sigma^{*'}}$ is large enough, or, when σ is sufficiently concave.

Regardless of whether the two groups choose the optimal or non-cooperative levels of governance, the qualitative effects on security and appropriation are similar. Of course, when the choices are non-cooperative the negative effects of a reduction in T are higher on levels of security, on appropriation, and on real income.

However, the level of T might also have an independent effect on the choice of governance expenditures themselves. If, for example, the two groups were to originally have the norm of choosing the optimal level of governance but suddenly face a shortfall in their expected incomes, they might refrain from that optimal level of governance expenditures and decide on a lower level or even the non-cooperative level of governance expenditures. Such a choice might come about because of internal disputes within groups as well as between the groups that are often precipitated by reductions in incomes or other crises. Allowing for a continuous effect of T on the level of cooperation between the groups regarding governance expenditures, we can posit that these expenditures are a convex combination of the optimal and non-cooperative choices:

$$g_i^\gamma = \gamma(T)\hat{g}_i + (1 - \gamma(T))g_i^* \text{ where } \gamma'(\cdot) > 0 \text{ and } i = A, B \quad (16)$$

Then, the total effect on appropriation of changes in pT becomes:

$$\frac{\partial a_{ii}^*}{\partial T} = -\frac{\gamma'(T)\sigma^\gamma(\hat{g} - g^*)}{2} + \frac{\sigma^\gamma}{2} \left[\gamma \frac{\hat{\sigma}'}{\hat{\sigma}''} + (1 - \gamma) \frac{\sigma^{*\prime}}{\sigma^{*''}} \right] + \frac{1 - \sigma^\gamma}{2} \quad (17)$$

where $\sigma^\gamma \equiv \sigma(g_o + g_A^\gamma + g_B^\gamma)$, $\hat{g} \equiv \hat{g}_A + \hat{g}_B$, $g^* \equiv g_A^* + g_B^*$, and $\hat{\sigma} \equiv \sigma(g_o + \hat{g}_A + \hat{g}_B)$.

The first term in Equation (17) is due to the change in the level of governance choices induced by a change in T ; that effect is negative since $\gamma'(T) > 0$, $\sigma^\gamma > 0$, and $\hat{g} > g^*$. Recapitulating, a reduction in the value of the contested resource T has three effects:

(i) A tendency to reduce appropriation because the value of the contestable resource is reduced (represented by the third term in Equation (17));

(ii) A tendency to increase appropriation because it reduces the governance expenditures and security (represented by the second term in Equation (17));

(iii) A tendency to increase appropriation because it reduces the degree of cooperation on the choice of governance expenditures between the groups (represented by the first term in Equation (17)).

Of course, the opposite effects are present on the real final income of the groups. In addition, each group's income is reduced directly since T is part of income, but which is counterbalanced by the reduction in governance expenditures as a result of a reduction in T . Final real income for each group is:

$$Y_i^r = \sigma(g^\gamma(T))T + R - g_i^\gamma(T) \quad (18)$$

Overall, the effect of the size of contested resources on incomes is ambiguous and depends on the *degree of cooperation* among the groups, which in turn can critically depend on *historical contingencies*. Economic factors are important but can only be a part of the story. History and elite norms of cooperation can be important as well.

4. Empirical framework

Our test of this model is based on estimations of a ‘short-term violence’ equation approximating, using a dependent variable (*Viol*) which reasonably well records the detail of each kind of political violence. We explore the determinants of political violence from the following level specification:

$$Viol_t = \alpha_0 + \alpha_i Z_t + \varepsilon_t \quad (19)$$

where Z is the vector of deterministic variables containing the variables that determine political violence.

Equation (19) can be seen as a trigger for short-term violence and estimates only the onset of violence; its duration is determined by other factors including the capacity of conciliation agencies and strategies pursued by contending parties. Equation (19) is estimated via the autoregressive distributed lag (ARDL) approach of Pesaran et al., (2001) based on quarterly data from 1990Q1 to 2005Q3. The ARDL approach has a number of appealing features. For one, it is applicable independent of whether the underlying variables are stationary, non-stationary and/or mutually cointegrated. This makes the ARDL approach less restrictive than comparable approaches. The ARDL further produces robust results in small samples (Pesaran and Shin, 1999), which is highly appealing in our setting. In addition, the inclusion of a significant number of lags resolve the endogeneity problem, and finally, a dynamic error correction model (ECM) can be derived from the ARDL that integrates short-run dynamics with the long-run relationship without losing any long-run information.

An ARDL representation of Equation (21) is formulated as:

$$\Delta Y_t = \beta_0 + \beta_2 Y_{t-i} + \sum_{i=1}^n \beta_2 \Delta \ln X_{t-i} + \sum_{i=1}^n \beta_1 \Delta \ln Y_{t-i} + \varepsilon_t \quad (20)$$

where Y is a vector of variables endogenous according to the model and consisting of political violence, investment, trust in the government and poverty. X is a vector of perceived pre-determined variables consisting of unemployment, political, militancy, inequality, pro-poor expenditure and unemployment.

The ARDL procedure involves bounds testing of Equation (20). These bounds tests involve an F-test on the joint null hypothesis that the coefficients on the level variables are jointly equal to zero (see Pesaran and Shin, 1999 and Pesaran et al., 2001). Instead of the conventional critical values, these tests involves two asymptotic critical value bounds, depending on whether the variables are $I(0)$ or $I(1)$ or a mixture of both. If the test statistic exceeds their respective upper critical values, then there is evidence of a long-run relationship. If the test statistic exceeds its upper bound, then the null of no cointegration can be rejected regardless of the order of integration of the variables. Inference is only inconclusive if the test statistics lies between the bounds.

If cointegration cannot be rejected, the conditional long-run model is then produced from the reduced form solution of Equation (20), when the first-differenced variables jointly equal zero. The long-run coefficients and ECM are estimated by the ARDL approach to cointegration, where the conditional ECM is estimated using OLS and the lag structure for the ARDL specification of the short-run dynamics is determined by the Schwarz-Bayesian criteria (SBC). The SBC is generally used in preference to other criteria because it tends to define more parsimonious specifications.

We estimate two types of model specification: (a) political violence is treated as the only endogenous variable and (b) a poverty-trap model interpretation where political violence, investment, trust in the government and poverty are treated as endogenous variables.

5. Empirical Results

Table 1 presents the ARDL (0) model that is based on Schwarz Bayesian Criterion (SBC). The long-run estimated coefficients along with regression statistics and diagnostic test statistics are reported. The regression diagnostic tests show that estimated model has passed serial correlation test. The estimated coefficients for poverty and militancy satisfy the theoretical sign restrictions. The estimated coefficients are highly statistically significant with P-values equal to 0.03 or less. Our empirical findings show that coefficients for trust in the government, investment, unemployment and pro-poor spending are all negative and significant, suggesting that these factors reduce political violence.

Table 1. Single-Equation Specification

Regressor	Coefficient	Standard Error	T-Ratio
TRUST	-0.368	0.154	-2.38**
POV	2.929	0.699	4.18*
FINV	-1.192	0.613	-1.94***
UINE	-3.592	2.073	-1.73***
PPE	-0.656	0.323	-2.02**
MILI	0.351	0.163	2.15**
GINI	0.466	0.333	1.39
CONST	-164.584	46.190	-3.56*
χ^2 SC(1) = .166		R^2	0.647
χ^2 FF(1) = 35.821*		\bar{R}^2	0.594
χ^2 N(2) = 42.351*		F-stat. F(7, 47)	12.31
χ^2 H(1) = 32.018*		DW-statistic	1.70

Source: Authors' estimates.

We now estimate the poverty-trap model where foreign investment and poverty are treated as endogenously determined variables. The estimated coefficients along with regression statistics and diagnostic test statistics are shown in Table 2. Estimated coefficients are higher in absolute magnitude compared with the estimates reported in Table 1. The ARDL estimates of pro-poor expenditure reported in Tables 1 and 2 are -0.65 and -0.71 respectively. Most of the coefficients are statistically significant at the conventional 5% level with the expected sign.

Table 2. Poverty Trap Model

Regressor	Coefficient	Standard Error	T-Ratio
TRUST	-0.309	0.146	-2.10**
POV	2.988	0.692	4.31*
POV(-1)	-1.481	0.672	-2.20**
FINV	0.640	0.895	0.71
FINV(-1)	-2.505	0.915	-2.73*
UINE	-5.065	1.954	-2.59**
PPE	-0.714	0.296	-2.40**
MILI	0.258	0.156	1.65**
GINI	0.855	0.335	2.55**
CONST	-84.343	51.922	-1.62
χ^2 SC(1) = .166		R^2	.716
χ^2 FF(1) = 35.821*		\bar{R}^2	.660
χ^2 N(2) = 42.351*		F(9, 45)	12.65
χ^2 H(1) = 32.018*		DW	1.90

Source: Authors' estimates.

With regard to the long-run results, we select the optimal lag length for ARDL to determine the long-run coefficients of the model. The model selected by SBC is (0,0,1,1) and the long-run estimated coefficients of the violence model are shown in Table 3. The results show that after we corrected for endogeneity bias, inequality is now significant. This indicates that inequality has an important effect on political

violence. In the case of Bolivia, this suggests that there exists a long-run relationship between violence and inequality.

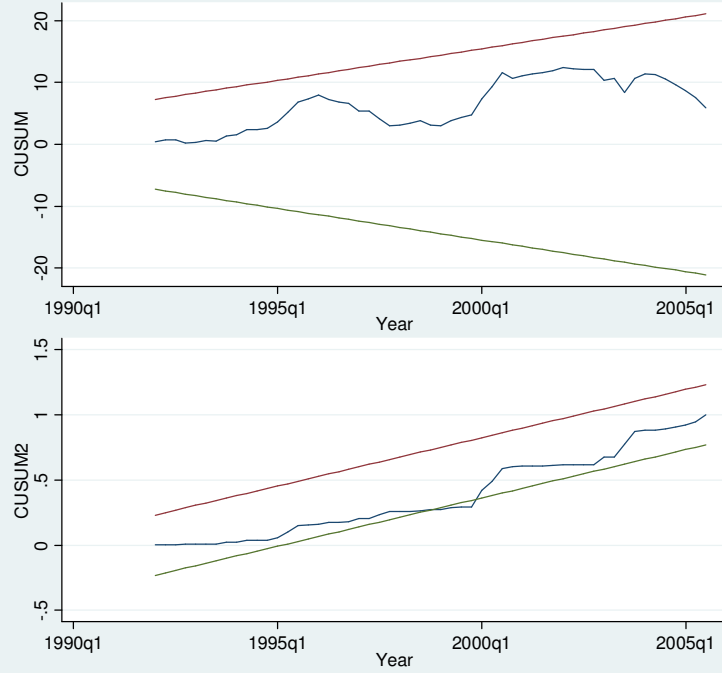
Table 3. The Long-Run Relationship (Poverty Trap Model)

Regressor	Coefficient	Standard Error	T-Ratio
TRUST	-.309	51.922	-1.623
POV	1.507	0.806	1.868***
FINV	-1.864	0.604	-3.08*
UINE	-5.065	1.954	-2.592**
PPE	-0.714	.296	-2.40**
MILI	0.258	0.156	1.651***
GINI	0.855	0.333	2.55*
CONST	-84.343	51.922	-1.623

Source: Authors' estimates.

We now proceed to examine the stability of the long run coefficients together with the short-run dynamics. Following Pesaran and Pesaran (1997), we apply the CUSUM test. The CUSUM test employs the cumulative sum of recursive residuals based on the first set of observations and is updated recursively and plotted against the break points. Similar procedure is used to carry out the CUSUM2 that is based on the squared recursive residuals. A graphical presentation of these two tests is provided in Figure 2. If the plot of the CUSUM and CUSUM2 statistics are found to be within the critical bounds of 5% level, the null hypothesis that all coefficients are stable cannot be rejected. Since the plots of CUSUM statistic for 'Violence' does not cross the critical value lines, the results indicate no evidence of any significant structural instability. The plot of CUSUMSQ statistic crosses the critical value line, indicating some instability. The graph suggests that parameter constancy may have broken down around 2000 according to the CUSUMSQ test.

Figure 2. The cumulative sums of the recursive residuals and their squares



6. Conclusions and Policy Implications

We have argued that ‘small-scale violence’, which is often the type of violence most frequently occasioned by episodes of economic crisis, is different from the kind of violence most frequently modelled by economists, namely civil war – it is shorter-term, more localised, more reactive rather than initiatory in nature, and much more than civil war it is a reflection of short-term political variables, in particular the credibility of government and the politicisation of the opposition. We simulate these factors through the use of a gaming model in which income can be derived from two different sorts of endowments, one of which (analogous to Bolivian natural gas deposits, or the mineral resources of other conflict-ridden countries) is contestable and exogenous and the other is endogenously determined within the model. In the empirical estimations of the reduced form of this model in section 3, indicators of the politicisation of the opposition, of the public’s mistrust of government, and of local-

level, as well as national-level, indicators of unemployment and inequality, emerge as significantly related to the likelihood of violence of this type.

The implications of these findings for policy would appear to be several. One of them is that politicisation and trust, not just objective measures of economic deprivation or affluence, are relevant to the explanation of violence of this type: what matters is not only how great inequality (for example) is, but what if anything government is perceived as trying to do to resolve it. A second conclusion is that if the root causes of violence reside in local -level rather than national-level variables – e.g. the levels of unemployment and inequality in El Alto, Bolivia rather than nationally – then it is in local-level rather than national-level policy action and media presentation that a possible resolution to short-term political violence of this sort resides.

A final implication is that the response of violence to particular types of stabilisation measure is not only instrument-specific but country-specific. The quietening of political violence in Indonesia in 1999 in response to initiatives in the field of pro-poor public expenditure and microfinance was much greater than that seen in Bolivia the following year – the year after the onset of crisis in each case – in response to the same instruments. Thus although these instruments can be seen, in general, as pro-poor and violence-calming in their impact, their magnitude of impact continues to be case-specific. Investigation of the possible causes of these variations is in our judgment an important priority for future research.

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Appendix

We collected data, over the years from 1979 to 2007, on the following variables: strikes and other industrial disturbances, roadblocks, street demonstrations and coups d'état (Appendix Table 1). These events are analysed by duration, region and industrial sector and collected from the following newspapers: *Presencia, El Diario. Hoy, El Mundo, Ultima Hora, La Razon, Los Tiempos*. The data are contained in Landa (2007) and are available from the authors.

There is another index of civil violence in Bolivia quoted by Evia, Skaperdas et al. (2007, page 7) as 'Social Conflicts Watch Programme - CERES (Bolivia)', By contrast with their index, ours:

(1) weights events by severity (one implication of this is that our index rises in 2003 when the most severe conflicts of the postwar period took place and then falls during the subsequent period of exhaustion and relative calm in 2004; their index, see page 7, stays flat in 2003 and then rises sharply in 2004)

(2) classifies violent events by likely cause

In addition, some data for Bolivia for the 1980s are available from the original OECD analysis by Paldam (1993) and these are factored into the analysis which follows.

Table A1. Definitions of main variables

Symbol	Meaning
VIOL	Number of deaths
UINE	Unemployment rate
GINI	Gini coefficient of inequality (on size distribution of income)
POV	Headcount poverty rate
TRUST	'trust in government'/perceptions of government action to meet needs of the militant (for further discussion)
MILI	'politicisation measure' (currently in Bolivia = share of militant parties within legislative assembly)
PPE	Pro-poor expenditure measure (expenditure on education and health measured as share of GDP)
FINV	Foreign investment rate