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Carrot or stick? Redistributive transfers versus policing in contexts of civil unrest

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Abstract: Recurrent episodes of civil unrest significantly reduce the potential for economic growth and poverty reduction. Yet the economics literature offers little understanding of what triggers civil unrest in society and how to prevent it. This paper provides a theoretical analysis in a dynamic setting of the merits of redistributive transfers in preventing the onset of (and reducing) civil unrest and compare it with policies of more direct intervention such as the use of police. We present empirical evidence for a panel of Indian states, where conflict, transfers and policing are treated as endogenous variables. Our empirical results show, in the medium-term, redistributive transfers are both a more successful and cost-effective means to reduce civil unrest. Policing is at best a short-term strategy. In the longer term, it may trigger further social discontent.

Keywords: Transfers, policing, conflict, unrest, India, panel data.

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1. Introduction

The magnitude of private and social costs of social and political instability across many developing countries has brought the analysis of civil conflict into the forefront of modern development economics. Conflicts across the world, ranging from civil wars to riots and civil protests, have affected millions of people and have resulted in lost opportunities in terms of economic growth and human development (Collier, 1999; Stewart et. al., 2001; Fearon and Laitin, 2003). Existing literature offers, however, remarkably little understanding of what determines this significant constraint to development and what can be done to prevent it.

The literature has mostly concentrated on two explanations for the origin of civil conflicts. They are, respectively, greed and grievance (see Collier and Hoeffler, 1998, 2004). Although in practice both motivations may co-exist simultaneously (Murshed, 2005), the greed explanation emphasizes the role of lootable rents in producing inter-group rivalry for their control, while the grievance concept refers to historical injustices and inter-group inequalities. Cross-country analyses have highlighted the importance of greed-related factors in determining the onset of civil wars (see Collier and Hoeffler, 2004; Fearon and Laitin, 2003). The relationship between forms of income inequality (grievance) and the onset of violent mass conflicts has been tested with mixed results (see Cramer, 2002 for a discussion). Analyses of between-group, rather than within-group, inequalities have been more successful. This body of research has emphasized the importance of horizontal inequalities between groups, classified by ethnicity, religion and other cultural characteristics, as sources of conflict (e.g. Stewart, 2002; Langer, 2004; Stewart, Brown and Mancini, 2005; Mancini, 2005; Østby, 2006), as well as of societal levels of polarization (e.g. Esteban and Ray, 1991, 1994; Foster and Wolfson, 1992; Wolfson, 1994; Reynal-Querol, 2001; Montalvo and Reynal-Querol, 2003; Caselli and Coleman, 2006), categorical inequalities

(Tilly, 1998) and ethnic fragmentation (e.g. Easterly and Levine, 1997; Elbadawi, 1992). Rises in economic and social disparities between different population groups, systematic social exclusion and other forms of perceived unfairness in social relations often result in the accumulation of discontent to a sufficiently high level to break social cohesion (Sigelman and Simpson, 1977; Bates, 1983; Horowitz, 1985; Muller, 1985; Muller and Seligson, 1987; Midlarsky, 1988; Schock, 1996), and increase the probability of some population groups engaging in rent-seeking or predatory activities (Benhabib and Rustichini, 1991; Fay, 1993; Sala-i-Martin, 1996; Fajnzylber, Lederman and Loayza, 1998; Grossman, 1991; 1999).

While this literature provides a good entry point into the analysis of the causes of civil conflicts, it offers little policy application in terms of what can effectively be done to reduce (or even prevent) the onset of conflict episodes. It also focuses mostly on the analysis of large-scale civil wars. Although civil wars have represented a serious constraint to development in recent decades, many developing countries have been badly affected by local conflicts and social upheavals (Barron, Kaiser and Pradhan, 2004; Boix, 2004). These forms of internal civil unrest may not necessarily result in large-scale wars. Nevertheless, they have been responsible for the destruction of livelihoods and markets, increases in the risk of investment, loss of trust between economic agents and the waste of significant human and economic resources, often more so than larger-scale armed conflicts (Barron, Kaiser and Pradhan, 2004). Persistent forms of civil unrest have also often constituted the preliminary stages of more violent conflicts, including civil wars.²

Despite the accumulation of evidence that economic and social factors contribute largely to the onset of civil conflicts, the general tendency of governments in economies prone to civil unrest

is to resort to the use of police and military forces to offset civil and political upheavals.³ This can be a counterproductive measure since it may not necessarily address causes of unrest, when this is rooted in forms of social injustice. Much has been written on the wasteful role of excessive expenditure on military and police forces (see Stewart, Fitzgerald and Associates, 2001 for review). Moreover, most populations living in democratic or semi-democratic regimes will be subject to a repression threshold beyond which the continued use of coercive force may result in resentment (see Gurr, 1970; Hirschman, 1981; Bourguignon, 1999; Boix, 2004), often triggering collective mobilization, which in turn increases the risk of outbreak or escalation of civil unrest.⁴

Policies that address directly the causes of social discontent may be likely to be more effectual at reducing conflict. The idea of resorting to social policies to keep stability can be traced to the first social insurance programs implemented in Europe in the late nineteenth century. These quickly extended from Bismark's Germany in 1880 to the rest of Europe, as a response to social demands derived from increasingly stronger workers unions' movements fomented by the expansion of the Industrial Revolution across Europe. In particular, Chancellor von Bismark saw the *Sozialstaat* as a means to win the new proletariat's loyalties and keep class struggle under control (Esping-Andersen, 1990; Sala-i-Martin, 1996).

Theoretical models have highlighted the importance of social policies and redistributive transfers in ending and/or preventing civil wars. Grossman (1994) argues that land reforms can result in less extra legal appropriation of land rents, whereas Grossman (1995) demonstrates how the redistribution of property income to the working classes (through wage subsidies or

² Rwanda, El Salvador, Guatemala and Nicaragua, amongst others, constitute recent examples of countries where civil wars were preceded by civil protests and widespread rioting (see Brockett, 1990; Seligson and McElhinny, 1996; Wood, 2003; Verwimp, 2005).

³ See for instance Brockett, 1990 for evidence in Central America.

lump-sum transfers) can decrease the probability of workers engaging in extralegal appropriative activities. Azam (2001) shows how systems of redistribution (in particular expenditure on health and education) within and amongst groups create solidarity links between them, which prevent the outbreak of political violence. Azam and Mesnard (2003) build a contract-theoretical model where promises of government transfers can be used as a pay-off to rebel groups not to engage in civil war. However, little is known empirically about the impact of transfers and redistribution on conflict, whether different types of civil unrest will respond in different ways to the implementation of such policies and how effective transfers are in relation to other more heavy-handed options.

The implementation of redistributive policies and income transfers is generally not a popular policy recommendation in today's developing countries. Income transfer policies and tax reforms are often constrained by budgetary and administrative limitations and the opposition of political and social elites (Radian, 1980; Newbery and Stern, 1987), and hence disliked by governments involved in the pursuit of electoral advantages and support coalitions. Fiscal redistribution is also believed to result in implicit taxes on investment and distort market forces (see Lindert and Williamson, 1985; Persson and Tabellini, 1994 for discussion).

There are forms of transfers – which in this paper we refer to collectively as redistributive transfers – that benefit those in need without necessarily distorting private investment decisions and harming economic growth (see Chenery et al., 1974; Bénabou, 1996; Killick, 2002). These include programs of public employment, investment in basic education and primary health care, food security programs and so forth. These policies decrease disparities across population groups by shifting incomes from the rich, or the whole population, into the accumulation of

⁴ Brockett (1990) and Petersen (2001) describe some of these mechanisms in Central America and Eastern Europe, respectively.

wealth and human capital amongst the poor (Bourguignon, 2002). As such, they should not be viewed as a pure form of income redistribution and are, therefore, less likely to cause political and social opposition. These forms of redistributive policies are furthermore likely to increase the potential costs of the poor engaging in conflicts (Boix, 2004), and may also raise the welfare of higher income groups that are negatively affected by civil conflict (but that may nonetheless oppose redistribution) since less instability will promote more attractive economic environments (see Grossman, 1994; Sala-i-Martin, 1996).

This paper addresses some of the gaps identified above by assessing the effectiveness of redistributive transfers versus the use of policing in the context of civil unrest in India. The paper does not intend to offer a full causal theory of civil unrest, but rather to uncover important mechanisms that may prevent the onset of and/or reduce civil unrest that have been thus far neglected in the economics literature on civil conflict. A conceptual framework for the analysis of the relationship between redistributive transfers, policing and civil unrest is developed. This framework models choices faced by decision-makers in an unequal, highly polarized society, where social discontent gives rise to civil unrest and the population is subject to a repression threshold, as discussed above. Within this framework, redistributive transfers are treated as endogenous to civil unrest, as they may simultaneously be cause and consequence of unrest when they affect the welfare characteristics of those involved.⁵ The model predicts that in societies with a high propensity for civil unrest, instability will only decrease when the marginal impact of transfers on civil unrest is higher than the marginal impact of policing. In the absence of a redistributive transfers system, these societies will only be able to avoid the escalation of conflict if they can afford indefinitely higher levels of policing. Societies with a lower propensity to civil unrest will be able to avoid the escalation of instability if a system of

minimum transfers is in place. These insights are supported by empirical evidence based on data on riots collected for a panel of fourteen Indian states for the period between 1973 and 1999. We find that, in the medium term, redistributive transfers are both a more effective and less costly option to avoid the onset of rioting and reduce existing instability in India. Although policing is an effective short-term option, in the longer-term it may trigger further unrest. This result is robust to different model specifications.

The paper is organized as follows. In section 2, we describe our conceptual framework for the analysis of the relationship between riots, police and civil unrest using a two-period recursive model. Sections 3 and 4 assess the validity of the conceptual model using empirical evidence from India. In section 3, we discuss briefly the Indian case study, while in section 4 we assess empirically both the theoretical assumptions used to construct the conceptual framework, as well as the main theoretical results. We first analyze the relationship between transfers, policing and civil unrest using standard dynamic panel models. We then introduce key endogenous constraints to the analysis. Section 5 concludes the paper.

2. Conceptual framework

We assume an unequal, highly polarized society, in social, economic and political terms, formed by two groups, A and B. Group A is formed by the elite found amongst the better-off strata of society and in the state apparatus. Group B is the remaining population characterized by limited (or sometimes excluded from) access to social, economic and political opportunities. In this society, inequalities between the two social groups (I_t) that result from differences in access to economic, social and political opportunities by group A or even rent-seeking activities that

⁵ While the assumption of inequality between groups is central in other models of conflict, such as those pioneered by Grossman (1991, 1994), we depart from these models by considering the important mechanism of a repression

benefit the members of that group in detriment of group B, lead to social discontent amongst members of group B and, consequently, to conflicts between the two groups.⁶

Choices regarding conflict management (i.e. choices about the use of police or the implementation of transfer programs) are taken by group A in a two-period (t and $t - 1$) decision process. In a situation of civil unrest, group A faces a ‘stick or carrot’ dilemma. The general tendency of policy-makers in economies prone to civil unrest is to resort to the use of police or military force to offset episodes of unrest. We contrast this policy decision with the use of redistributive transfers, which, we argue, will address directly the causes of social discontent.

We start from an initial setting where society is subject to a repression threshold, whereby the excessive use of force causes discontent amongst the population. P_t represents the immediate or short-term effect of the use of police on conflict. This effect is negative, indicating that the immediate use of police will reduce the onset of civil unrest in period t . P_{t-1} represents the long-term effect of continuous use of police on conflict. The existence of a repression threshold is incorporated in the positive coefficient of P_{t-1} .

The interplay between inequality, use of police and civil unrest can be represented in a difference equation:

$$C_t = C_{t-1} - \sigma P_t + \lambda P_{t-1} + \theta I_{t-1}, \quad (1)$$

where the initial level of conflict (C_t) depends on the use of police, as described above, the level of conflict in the previous period (C_{t-1}) and on inequality. It is therefore assumed that, in the

threshold, as well as treating redistributive transfers as endogenous to conflict.

absence of factors that either contain or encourage conflict, the level of civil unrest in period t will be the same as in the previous period. This may result in the emergence of ‘conflict traps’ as found in Azam, Collier and Hoeffler (2001) and Collier (2000). Conflict is also determined by the level of inequality between the two groups that form this society. In particular, it depends on past levels of inequality (I_{t-1}), assuming that it will take a while before feelings of unfairness result in the breach of social cohesion (Hirschman, 1981; see also Dutta and Mishra, 2003).⁷

σ , λ and θ are coefficients that represent the marginal impacts of each variable on civil unrest. They are normalized to take values between 0 and 1, inclusive. σ and λ are fixed coefficients that represent the intertemporal impact of the use of police and military forces on conflict. If $\lambda < \sigma$, the steady state impact of policing on conflict will be negative and there will be a decrease in the potential for conflict from one period to the next. $\lambda > \sigma$ represents a society with a high potential for conflict, where λ is in effect a measure for people’s ‘memory’ of the effects of repression. θ represents the inverse of the level of inequality aversion in society (Atkinson, 1970; Hirschman, 1981). Values of $1/\theta$ close to zero indicate a society with a high tolerance for inequality, whilst values close to one indicate high levels of inequality aversion. In order to simplify the model, we assume that only relative income inequality matters. More specifically, civil unrest in this model is affected by intertemporal differences between changes in the income of group A (ΔY^A) and changes the income of group B over time (see Boix, 2004). We make a further assumption that group B’s savings are negligible over time as this group will generally be characterized by low incomes. If we normalize their income by the poverty line, any changes in the income of group B over time will equal the amount of transfers (T_t) in society. In other words, $I_t = \Delta Y^A - T_t$. This expression defines inequality as the

⁶ This characterization is close to oligarchic societies described in Brockett (1990), Grossman (1991), Wood (2003) and Acemoglu (2007), Acemoglu and Robinson (2007).

⁷ The validity of these coefficient signs will be assessed empirically in section 4.

difference between maximum and minimum incomes accrued to population groups agglomerated, respectively, at the top and bottom of the distribution.⁸ This is a crude measure of inequality but is useful as an indication of effectively observed level of inequality in society.⁹

Incorporating these assumptions into (1) gives us the main theoretical framework which will be used in this paper to derive important hypothesis on the relationship between redistributive transfers, police and civil unrest:

$$C_t = C_{t-1} - \sigma P_t + \lambda P_{t-1} + \theta \Delta Y^L + \theta T_{t-1}, \quad (2)$$

Each variable in equation (2) represents a choice process. The decision on the amount of police to be used in each period depends on the amount of unrest society faces and is given by $P_t = \alpha C_t$, where α , with $0 \leq \alpha \leq 1$, measures the elasticity of the use of police in response to civil unrest. Response takes place in the same period t as police is generally called for at the time when episodes of upheaval take place. As with policing, transfers between the two groups (T_t) will depend on the level of civil unrest observed in society, i.e. $T_t = \beta C_t$, where β , with $0 \leq \beta \leq 1$, measures the elasticity of the use of redistributive transfers in response to civil unrest.

These propositions provide a solution for the difference equation (2). This solution is given by the general form $C_t = J(K)^t + L$, where J can be fixed by some initial condition C_0 ,

$$K = \frac{1 + \alpha\lambda - \theta\beta}{1 + \sigma\alpha} \quad \text{and} \quad L = \frac{\theta}{\alpha(\lambda - \sigma) - \theta\beta} Y^A. \quad J + L \quad \text{represent the initial level of civil unrest,}$$

⁸ This definition establishes implicitly that, by resorting to conflict, group B does not incur in significant costs. Costs can be incorporated into the analysis by assuming transfers to be net of costs. Boix (2004) incorporates explicitly the costs of conflict for the perpetrators of conflict in his game theory analysis but his results do not differ significantly from ours. See also Becker (1967).

⁹ Boix (2004) uses a similar measure of inequality in an independent study of conflict.

whilst L represents the amount of unrest that will always persist, even when $(K)^t \rightarrow 0$ and σ , λ , θ and δ are fixed. It constitutes thus a dynamic equilibrium or stationary state for C_t . $J(K)^t$ specifies, for every period of time, the deviation of C_t from its dynamic equilibrium.

The equation has three regions in its moduli space, corresponding to $K > 1$, $K = 1$, and $K < 1$. In the first region, civil unrest will increase. The second region corresponds to a discontinuity point. In the third region, civil unrest will decrease (i. e., converges towards its dynamic stable equilibrium, L).

In order to be in region 3, our region of interest, we must therefore have:

$$\frac{1}{\theta}(\lambda - \sigma) < \frac{\beta}{\alpha}. \quad (3)$$

Condition (3) has important policy implications. The right-hand side of (3) represents the ratio between policing and transfer elasticities, whereas the left-hand side of (3) includes the expression for the repression threshold $(\lambda - \sigma)$, calibrated by the inequality aversion coefficient (recall that $\theta = 1$ represents a society with high inequality aversion or, in other words, with low tolerance for inequalities).

When faced with a situation of conflict, group A must decide whether to have a system of transfers to those in group B. β/α represents this important choice mechanism. In reality, this ratio depends on various factors and is affected by political and social institutions, including voting mechanisms and the relative bargaining power of the two groups. For the purpose of the model at hand, we assume that group A has perfect information and control over this choice

mechanism. We will first consider the case in which group A decide to transfer income to group B or implement systems of transfers (i. e. $\beta > 0$). The impact of the use of transfers on conflict depends in turn on the level of the repression threshold in society ($\lambda - \sigma$).

*Scenario 1: Positive transfers when $\lambda \leq \sigma$.*¹⁰ In this scenario, condition (3) is always true, since all coefficients take values between 0 and 1, inclusive. In this region, it does not matter whether new episodes of civil unrest are tackled by using transfers or policing. This is a situation likely to take place in either a well-functioning democracy or an efficient dictatorship regime. In a democracy, everyone votes over the optimal level of taxation (i. e. β). Therefore, the higher the level of inequality, the higher the preference of the median-voter for taxation, which puts redistribution always at its optimal level (Persson and Tabellini, 1994; Alesina and Rodrik, 1994). In a dictatorship, those at the top will be powerful enough to exclude other groups from any decision-making process. Consequently, only a minimum level of transfers will take place. This is similar to previous findings in the interest group theories (Buchanan and Tullock, 1962; Buchanan, 1967).

Scenario 2: Positive transfers when $\lambda > \sigma$. Societies in this scenario are generally neither full democracies nor efficient dictatorship regimes. In this case, the onset of new conflict depends on whether transfers are used or not. When $\lambda > \sigma$, the use of police is ineffective. The only way to decrease conflict in the long term is to decrease inequality. Because this society responds strongly to repression, group A must take into consideration the fact that the other group may have the capacity to engage in conflicts and have therefore some bargaining power in the decision-making process. There is hence an interdependency between the welfare functions of the two groups. This results from the fact that by instigating unrest, one group (group B) is able

to influence the welfare of the other group (because property is destroyed, the risk of investment increases or conflict affects the lives of group A). This interdependency will result in redistribution, as demonstrated in Zeckhauser (1971), Sala-i-Martin (1994) and Sen (1997). Group B will demand a certain level of redistributive transfers and group A must decide on the adequate level of transfers.

Condition (3) allows the calculation of the optimal ratio between the use of transfers and policing that leads to a decrease of conflict in a society characterized by $\lambda > \sigma$. This ratio takes into account the relationship between $(\lambda - \sigma)$ and θ . The optimal ratio will depend on the aversion to inequality coefficient $1/\theta$. The closer this coefficient is to one, the larger the reduction in inequality must be for conflict to decrease. In order to guarantee decreases in conflict, we must have $(\lambda - \sigma) > \theta$. This implies the following condition:

$\frac{1}{\theta}(\lambda - \sigma) > 1 \Rightarrow \frac{\beta}{\alpha} > 1 \Leftrightarrow \beta > \alpha$. In other words, in scenario 2, conflict will be reduced iff the transfer elasticity coefficient is larger than the police elasticity coefficient. In those circumstances, group B will realize that their income and well-being is increasing, inequality is decreasing, and thus have no incentive to resort to further conflict. This result is in line with the theoretical conditions derived by Ghate, Le and Zak (2003) in a general growth model with instability.¹¹

Scenario 3: No redistributive transfers. In this scenario, civil unrest will decrease iff

$\frac{1}{\theta}(\lambda - \sigma) < 0$, i.e. iff $\lambda < \sigma$. In other words, in the absence of systems of redistribution, the

¹⁰ The case $\lambda = \sigma$ is included in this scenario because we assume $\beta \neq 0$. Condition (3) is automatically satisfied for $\lambda = \sigma$ and $\beta \neq 0$.

¹¹ In an independent study, these authors show, using a theoretical growth model, that the marginal efficiency of the police at reducing socio-political instability and the marginal sensitivity of socio-political instability to changes in

immediate use of police has to be either very large or very efficient. If not, conflicts between the two population groups will always increase away from its equilibrium state. The distance in society from its equilibrium point will depend on how much repression group A can afford. If group A have a lot to loose, they may vote for a little redistribution and perhaps move society into scenario 1. If this group does not have a lot to loose and can sustain indefinitely high levels of repression, scenario 3 will prevail. Sustainable increases in policing will depend on several factors such as the ability of group A to increase the overall economy's capacity to attract national and international investment, its endowment in natural resources (see Collier and Hoeffler, 2004; Ghate, Le and Zak, 2003), or on how mobile capital is (thus allowing group A to send capital abroad and avoid costs of conflict) (see Boix, 2004). If sustainable increases in the level of policing are not affordable, conflict may escalate indefinitely.

The remainder of this paper focuses on scenario 2. In scenario 1, conflict will always decrease unless society is subject to a very large shock that will move its equilibrium point beyond which redistributive transfers will become ineffective. In scenario 3, civil unrest can only be controlled through the use of police. Once this is no longer affordable, either group A compromises and sets a system of transfers in place (in order to move society to scenario 1) or unrest will become unmanageable and widespread fighting, and potentially war, may erupt. Scenario 2 describes the situation faced by many societies in the world prone to civil unrest but not affected (yet) by widespread armed conflict. One of these societies is India. In the next section, we analyze this case study in light of the mechanisms discussed above. In section 4, we test empirically the relationship between redistributive transfers, use of police and civil unrest across a panel of 14 Indian states in the 1973-1999 period, which covers critical times of instability in modern India.

the income distribution determine the economy's growth trajectory in a country characterized by high inequality and political instability.

3. India case study

India is a particularly good example of a scenario 2 society, characterized by a high propensity for civil unrest but with a system of redistributive transfers in place. Table 1 shows estimates for σ and λ coefficients for a panel of 14 Indian states for selected years between 1973 and 1999.¹² These estimates place India in scenario 2 in every year with the exception of 1987. India's religious, social and political diversity has often given rise to clashes between different population groups. Despite its violence at times, civil unrest has not resulted into full scale civil wars, as in other parts of the world. India has a strong police force but also a well-functioning democratic system that responds fairly effectively to demands from various social groups. These features have allowed us to analyze in detail several facets of the model outlined in section 2. The size of each Indian state and their common federal system have, in addition, allowed us to incorporate in our analysis important variations across very different economies, while avoiding concerns regarding data comparability across countries.

Forms of social mobilization and collective action that result in episodes of civil unrest are relatively common in India (see Varshney, 2002; Wilkinson, 2005; Justino, 2006a). Some have been triggered by separatist movements, though most have been caused by clashes between different castes, and between opposite ethnic and religious interests (largely between Hindu and Muslim communities), as a response to disparities in the distribution of employment conditions, access to land and other assets, use of and access to social services and access to institutional

¹² The empirical analysis in this paper is based on a panel of 14 major Indian states observed across six years within the 1973-1999 period: 1973-74, 1977-78, 1983, 1987-88, 1993-94 and 1999-2000. These dates correspond to the dates of the large sample National Sample Surveys (NSS), from where we have derived some of the explanatory variables. We focus on these six years in order to ensure consistency across all variables. The states are Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. In 1999, these states represented 93.3% of the total Indian population.

power and legal institutions (Hardgrave, 1993; Oberoi, 1997; Varshney, 2002; Brass, 2003; Wilkinson, 2005; Justino, 2006a).

Figure 1 illustrates the evolution of civil unrest in India, measured by the number of riots recorded by the various state police bureaus,¹³ between 1973 and 1999 (figure 1).¹⁴ The figure shows a decrease in the number of riots across India in the mid part of the 1970s (most likely resulting from the state of emergency imposed by the Congress-led government in 1975), followed by an increase in rioting from the late 1970s through most of the 1980s triggered by the Aligarh riots in 1978 and unrest in the Punjab in the same period (which eventually resulted in the assassination of the Prime Minister Indira Gandhi in 1984). These events were followed by a period of relative stability (which put India in scenario 1 in 1987 – table 1). The early 1990s saw a further increase in rioting, particularly pronounced after the destruction of the Ayodhya mosque in 1992 (see Varshney, 2002 for a more detailed analysis). Violent riots have since then taken place in rural and urban areas in Gujarat, Maharashtra and Bihar, amongst other states. In addition, violence against Dalits (former ‘untouchables’) has been widespread across various states both in rural and urban areas (Banerjee and Knight, 1985; Human Rights Watch, 1999, 2000, 2001), while increasing linguistic and cultural identities have led to conflicts against outsiders in Maharashtra, Assam, Gujarat, Karnataka, Madhya Pradesh, Orissa, Maharashtra and Uttar Pradesh (Human Rights Watch, 2000, 2001).

¹³ Riots are typically defined as collective acts of spontaneous violence that include five or more people (Gurr, 1970). Riots are classified as violent crimes by the Indian Penal Code, under the category of cognisable crime. The data on riots is provided by the National Crime Records Bureau (NCRB), part of the Indian Ministry of Home Affairs.

¹⁴ Figure 1 in reality may represent an underestimation of the extent of riots in India since the data is likely to underreport the true extent of riots as the police (who records the occurrence of riots) has not intervened in recent years in riots of small scale and duration. The reliability of the data depends also on the reporting accuracy of each state police bureau. Possible data measurement errors will, however, be systematic across all states and all years and thus unlikely to affect significantly our empirical results.

Despite its seriousness at times, episodes of rioting in India have not resulted in major civil wars as in other countries in Africa and South and Central America. It has been suggested that the Indian federal system provides the main institutional form of conflict management. India is divided into 25 states, each representing roughly one dominant ethno-linguistic group. Although each of these groups is divided into different castes and religions, federalism allows the compartmentalization of conflict into contained borders and conflict in one state rarely spills on to another (Hardgrave, 1993). Indian's electoral system also contributes positively towards the resolution of civil unrest. Problems of ethnic and regional conflicts tend to ease when political and group leaders deal with them by accommodating demands from different factions and using their bargaining power within the democratic political process (Hardgrave, 1993). As with any other country, the Indian government often intervenes in the mediation and resolution of conflicts that take place in the country with a mix of a 'carrot' and 'stick' approach depending on various social and political circumstances.

Table 2 provides estimates based on published data for the use of police and transfers in India between 1973 and 1999, while table 3 reports the coefficients of correlation between, respectively, transfers (lagged one period) and rioting, and the use of police (current and lagged) and rioting in India, following the conceptual framework illustrated by equation (2) in the previous section. Redistributive transfers are measured by a composite variable which reflects the concept of redistributive transfers outlined in section 1. This variable includes the annual real expenditure per capita at 1980-81 prices (in rupees) in education; medical, public health and family welfare; welfare of scheduled castes, schedule tribes and other backward classes; labour welfare; social security and welfare; and nutrition. The use of police is represented by the number of civil plus armed police per 1000 people, as both types are called in a situation of unrest.

Despite similar percentage increases in transfers and policing across India between 1973 and 1999 (table 2), the results in table 3 show that the use of police has been weakly correlated with the occurrence of riots in India (see Hardgrave, 1993 for further evidence), particularly in the longer term, as envisaged by the framework discussed in the previous section. This result further emphasizes the estimates in table 1, which place India in scenario 2 in almost every year since 1977. In table 3, only five states report statistically significant coefficients for P_{t-1} , two of those being largely positive (Gujarat and Uttar Pradesh).

Transfers seem to have a more significant impact on the reduction of unrest across Indian states. The coefficients of correlation between (lagged) transfers and the number of riots across Indian states is almost always negative and statistically significant. This result is even more significant in view of the fact that public expenditure on social services in India is very small in comparison to other developing countries.¹⁵

While illustrative of some aspects of the conceptual model, the results in table 3 are simple correlations obtained without further consideration for other possible determinants of civil unrest in India. In the next section, we move beyond simple descriptive analysis and investigate in further detail the effectiveness of transfers in containing conflict in India, relative to the use of police forces, in face of other factors that may influence the onset of civil unrest in India.

4. Empirical analysis

¹⁵ The World Development Report 2000-01 shows that, in 1997, India spent 3.2% of its GNP on education, against an average of 4.1% in other low- and middle-income countries. Between 1990 and 1998, India's public expenditure on health services represented, on average, 0.6% of its GNP, whereas the same percentage for other low- and

This section presents and discusses the empirical estimation of the intertemporal impact of transfers and policing on civil unrest in India. We assess the validity of the conceptual framework introduced in section 2 by testing the main assumptions of the model, in particular the signs and significance of key coefficients discussed in section 2. Our empirical analysis is based on data for a panel of fourteen major Indian states (Andhra Pradesh, Assam, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal). The use of panel data allows us to capture the large heterogeneity between all Indian states in terms of social, cultural, religious, economic and even political characteristics. The choice of states for the panel was based on data reliability, which is higher for the larger states. We do not expect that the exclusion of smaller states and Union territories to affect significantly our results.

4.1. Estimation approach – basic model

The conceptual framework derived in section 2 (equation (2)) allows us to derive a reduced-form equation suitable for econometric testing. If we relax the assumption of unitary rate of change of civil unrest across time and assume the existence of a normally distributed vector of unknowns uncorrelated with the vectors of independent variables, we can re-formulate equation (2) to take into account the panel dimension of the Indian dataset. The resulting expression is given by

$$C_{it} = \alpha_i + \beta_t + \gamma Y_{it-1} + \delta P_{it} + \varepsilon_{it}, \quad (4)$$

middle-income countries was 1.9%. Remarkably, such small outlay has proved to have very significant positive impact on India's economic growth in the same period of time (Justino, 2006b).

with $\alpha_i = \nu_i + \Delta Y_i^R$, where ν_i represents state-specific effects, with $i = 1, \dots, 14$. ΔY_i^A is the level of income of group A in each Indian state. β_t are the year effects, with $t = 1973, \dots, 1999$.¹⁶ Y_{it-1} is the vector of lagged regressors with $Y = f(C_{t-1}, P_{t-1}, T_{t-1})$, where C_{t-1} represents levels of civil unrest lagged one period, P_{t-1} is the level of policing used in period $t-1$ and T_{t-1} is the lagged level of redistributive transfers. P_{it} represents the use of police in the current period. ε_{it} is the panel error term. The levels of civil unrest, police and redistributive transfers are represented by the variables described in the previous section. Table 4 presents descriptive statistics for these and other variables used in this section.

Equation (2) in section 2 (and its reduced-form equation above) are necessarily simplifying illustrations of the complex structures that may explain the onset of civil unrest in a given society. This structure was deliberately kept parsimonious until now in order to illustrate clearly important trade-off mechanisms between the use of redistributive transfers and the use of police in a dynamic setting of civil unrest. Civil unrest may of course be also affected by a variety of state- and national-level variables not controlled for in equation (2). In order to address the simplistic nature of the assumptions used to derive the conceptual framework in section 2, we have introduced new variables into the empirical estimation of equation (4).

The resulting transformed equation for the extended model is given by

$$C_{it} = \alpha_i + \beta_t + \gamma Y_{it-1} + \delta P_{it} + \eta X_{it} + \varphi N_t + \varepsilon_{it}, \quad (5)$$

¹⁶ Although periodicity is not constant across all periods, the estimators are efficient and unbiased as the econometric models will consider observations for each variable in the same time periods (Greene, 2000).

where X_{it} is a vector of independent variables that vary across state and time and N_t is a vector of national-level independent variables, invariant across state.

Research on the causes of civil unrest has suggested that the propensity of societies for engaging in conflict may depend on the extent of poverty in the country and across different population groups (Elbadawi, 1999; Stewart et al., 2001). Macroeconomic analyses of civil war point to low-per capita income as the most robust explanatory factor in cross-country studies to explain the risk of violent internal conflict breaking out (Collier and Hoeffler, 1998; Elbadawi, 1992; Stewart, 2002). In addition, conflict is more likely to occur in poor countries, and conflict-affected countries generally have higher levels of poverty and lower growth rates (Collier et al., 1999; Collier et al., 2003). In order to consider the impact of poverty on civil unrest in India, X_{it} includes the number of people below the consumption poverty line across Indian states, lagged by one period. We have considered both aggregate poverty values and disaggregated values for rural and urban areas. Civil unrest is, in addition, likely to depend on the level of economic and social development of each state (Collier and Hoeffler, 2004). In order to control for these possible determinants of conflict, we have modelled the impact of the level of state income (logarithmic function of per capita net state domestic product at 1980-81 constant prices) on the probability of rioting in India, as well as the impact of the level of education in each state (measured by the per capita number of individuals enrolled in primary and secondary education). X_{it} also takes account of current levels of redistributive transfers in order to incorporate both long- and short-term responses of civil unrest to the use of transfers, as with the use of police.

Equation (5) comprises two national-level variables. The first is a measure for openness of the Indian economy, given by the all-India ratio of imports and exports over national domestic

product (per capita at 1980-81 constant prices). This variable is invariant across the fourteen states. The inclusion of this variable was motivated by the fact that economic liberalization, which accelerated in India in the early 1990s (Srinivasan, 2001), has been put forward as a potentially important cause of civil unrest since economic reforms may cause some groups to benefit and others to become worse-off (see Winters, 2002). Civil unrest may also be affected by how well (or how badly) social and political institutions operate (see Alesina et al., 1996; Barro, 2000; Acemoglu and Robinson, 2007). In order to capture the effects of political institutions on conflict, we have considered the impact of a second national-level variable representing the result of national elections. A growing body of literature has examined the proximity between political elections and the outbreak of riots in India (Varshney, 2002; Wilkinson, 2005). In order to test this relationship at the state level, we have used a binary variable that takes the value 1 if the Indian National Congress party obtained the majority of the votes in each given year.¹⁷ Descriptive statistics for these variables are available in table 4. The results for the estimation of the model above, using standard panel fixed effects estimation methods,¹⁸ is presented in table 5, columns 1, 2 and 3.¹⁹ We discuss the results in subsection 4.3. Before that we address the issue of endogeneity in the equations above.

4.2. Estimation approach: Correcting for potential endogeneity

¹⁷ The Indian National Congress Party has been for a long time one of the largest political parties in India. Founded by Nehru in the 1940s, the Congress Party was in power almost without opposition until 1977. At that time it was beaten in the national elections by the right-wing Bharatiya Janta Party, but recovered its position quickly in 1980. The Bharatiya Janta Party returned to power in the 1990s and has been the ruling party in India since 1996 (Election Commission of India, <http://www.eci.gov.in>).

¹⁸ Results from the Breusch-Pagan test (Breusch and Pagan, 1980) suggest that we should reject the presence of random effects. The Breusch-Pagan method tests the null hypothesis that $\text{Var}(\varepsilon)=0$. For both equations (3) and (4) we obtained $\chi^2(1) = 8.75$ with $\text{Prob} > \chi^2 = 0.0031$.

¹⁹ The uncorrected model showed signs of heteroskedasticity and serial correlation. In order to deal with these statistical problems, the results for the fixed-effects models are based on robust standard errors estimated using White's variance estimator and clustered at state level.

We must take into consideration concerns over potential endogeneity in the models 1, 2 and 3 in table 5. These models contain at least one lagged endogenous variable – the lagged volume of riots. Even if this variable is not correlated with ε_{it} , fixed effects estimators may not be consistent because t is finite (Wooldridge, 2002). Another possible source of endogeneity results from the conceptual framework outlined in section 2. The framework implies that rioting, redistributive transfers and use of police are determined simultaneously within the decision process of group A. Hence, the standard fixed effects estimator in columns 1, 2 and 3 of table 5 may be inconsistent as the right-hand side regressors are likely to be correlated with the disturbance term. We have used two procedures to correct for potential endogeneity. The first procedure is the generalized method of moments (GMM) developed in Arellano and Bond (1991). The second is an instrumental variable method using two-stage least squares (2SLS) adapted by Baltagi (1995, chapter 7) to panel data.

The GMM procedure has become quite popular as a method to correct for biases introduced in the panel models by the presence of the lagged endogenous variable (such as equation (5)). This method allows also for undetermined endogeneity in the other regressors by using the first differences of all variables and lags of all variables as instruments. This estimator is consistent and efficient as long as the X_{it} variables are predetermined by at least one period, and there is no second-order autocorrelation in the first-difference of the residuals. The GMM procedure is thus quite useful to estimate a dynamic panel of the type represented in equations (4) and (5), where the regressors may be correlated with the error term due to the inclusion of lagged endogenous regressors, or due to unknown endogeneity in the other regressors. The GMM is less reliable when most variation in the data derives from cross-section observations and not from differences across time as table 2 seems to suggest. We nonetheless report the GMM estimates in column 4, table 5 for comparative purposes.

The conceptual specification developed in section 2 models the relationship between redistributive transfers, police and civil unrest through a simultaneous system of three equations. This indicates that endogeneity can therefore be modelled by estimating equations (4) and (5) using instrumental variable techniques. Baltagi (1995, chapter 7), has adapted the standard two-stage least squares (2SLS) procedure to panel data. This method allows the estimation of a single equation from a system of equations whose functional form does not need to be estimated, though an equal number of instruments and endogenous variables must be provided. These include the level of rioting itself. All exogenous variables in the first equation are taken to be additional instruments in the first-stage estimation of the social expenditure and police equations. Results for the adapted 2SLS estimator are provided in column 5, table 5. We used four instrumental variables, in addition to all exogenous variables in equation (5). These were the membership of labour unions, the number of people in live register, capital and non-capital public expenditure income shares and population levels in each state. Membership of labour unions in India is often closely linked to the formation of political parties, as well as being often involved in the process of riot formation in India (see Varshney, 2002). Labour unions have also played an important role in the establishment of welfare policies in India (Justino, 2006a), and are thus likely to affected the levels of public expenditure on social services. At the same time, membership of labour unions will be exogenous to the variables being modelled in this section as it depends on the job taken by each members (determined by either individual skills or caste). The second instrumental variable is the number of people in live register in each state. This variable provides a good approximation to the level of unemployment in each Indian state. Levels of unemployment are exogenous to the processes being modelled in equation (2) as they are determined by the business environment and economic conditions in each state. Unemployment has, however, being pointed as a possible cause of civil unrest (e.g. Humphreys

and Weinstein, 2004), as well as being used as an indicator for levels of public expenditure on social services (as these include unemployment benefits). The third instrumental variable is public expenditure on capital and non-capital items across India. This variable will be associated with transfers in India as social services are a component of the capital account. In order to eliminate possible serial correlation we have used the share capital and non-capital expenditure on state income. The share of capital and non-capital expenditure are exogenously determined by economic policy decisions based on accrued revenues. Finally, levels of population in each state are used as an instrument for state demographic characteristics. We do not expect the first three instruments to affect the number of police in India, which is expected to depend mostly on the volume of civil unrest plus all other exogenous variables from the first equation.

The results for both the GMM and the 2SLS estimations are presented in table 5. The GMM estimator (column 4) is the more efficient Arellano-Bond two-step estimator given the presence of heteroskedasticity we found in the model. We have estimated Sargan tests for over-identification of restrictions in the GMM model presented in table 5. These confirm the validity of our results. We also rejected the hypotheses of first- and second-order autocorrelation in all models at less than 5% level of significance (see bottom of table 5). Instruments used in the 2SLS estimation were found to be statistically significant (see table 5). Column 5 shows the second-stage 2SLS results which estimate directly equation (5).

4.3. Empirical results

4.3.1. Redistributive transfers or policing?

The results show that rioting in India is negatively correlated with the level of transfers. The coefficient is small and statistically insignificant in column 1. Its magnitude increases with the inclusion of additional controls, suggesting that the model in column 1 may be underspecified. In the initial specification of the extended model (columns 2 and 3), only the current expenditure coefficient is statistically significant. Both lagged and current coefficient become statistically significant in the endogenous framework estimated in columns 4 and 5. The results confirm the hypothesis that higher levels of redistributive transfers are associated with decreases in civil unrest across India. As expected, the relationship between transfers and civil unrest is particularly significant in the long-term: the number of riots decrease by 0.3-0.4% for each extra rupee per capita spent on social services in year t and by 10.5-12.1% for every extra rupee per capita spent on social services in period $t-1$. This relationship is shown across all model specifications but statistically significant only in columns 4 and 5, where the transfers variable is modelled as endogenous to the process of civil unrest. These results suggest that failure to address the endogenous nature of this variable may result in the underestimation of the significance of the impact of redistributive transfers on civil unrest.

In all model specifications, the current use of police has a negative coefficient, whereas the coefficient for lagged policing is positive. These results confirm the presence of a repression threshold in India. The coefficients show that on average across the main 14 states, India needs to hire 20 more policemen in order to have one less riot per year (using the preferred 2SLS results), whereas every additional 25 policeman used in each period will result in one additional riot five years later. The average entry salary for a policeman in India in 2004 was around Rs. 8000 per months. This makes policing a rather expensive way of dealing with riots. These results are in accordance with the predictions of the theoretical model discussed in section 2. This repression threshold may be partially due to the heavy-handedness of police intervention at

times (Upadhyaya, 2002). As argued in section 2, excessive use of force is likely to result eventually in an increase of resentment and, consequently, in the increase of the potential for further civil unrest.

These results suggest that the level of redistributive transfers across the various Indian states has been sufficient to avoid the escalation of civil unrest in India. Whether intentional or not, and despite its small outlay, redistributive transfers have had a significant impact on the prevention and reduction of civil unrest in India, particularly in the medium term, as described by the conceptual framework in section 2. This is most likely due to the fact that redistributive transfers not only address distributional concerns that may trigger social mobilization into rioting, but also contribute towards the reduction of poverty. The use of police is a less successful and more costly option in reducing and/or preventing civil unrest in India. While in the short-term it reduces unrest, in the medium term, the continued use of police has either inconsequential effects on civil unrest or is associated increases in rioting in India.

4.3.2. Additional controls

Civil unrest in India is affected to some measure by additional variables. These are past levels of civil unrest, poverty headcounts, levels of state income, school enrolment rates, the level of economic liberalisation and election results. The inclusion of these controls in columns 2 and 3 of table 5 provides a richer picture of conflict processes in India. Only past levels of civil unrest, state income and poverty are statistically significant across the various models. Their inclusion in columns 2-5 do not, however, change significantly the strength of the relationship between redistributive transfers, police and rioting across Indian. They do however add further to the story being told by the results in table 5.

The results show that current levels of rioting are positively affected by the extent of rioting in the previous period. The coefficient is quite stable across all model specifications in table 5. The inclusion of control variables in column 2 reduces the magnitude of the coefficient in relation to column 1 but only by a small amount. This is in line with the existence of ‘conflict traps’ found in other studies (Azam et al., 2001; Collier, 2000). In the presence of adequate controls, the danger of this ‘trap’ will disappear in the long-term: the coefficient for lagged conflict is in all equations statistically significantly different from (and less than) one, indicating that past levels of conflict will affect current levels of conflict at a progressively lower rate. This would be expected in a society established in scenario 2 (see section 2), with an effective system of redistributive transfers in place.

Levels of state income have a positive and statistically significant impact on rioting in India. This indicates that states with higher economic growth may expect to experience larger amounts of civil unrest. This result is inconsistent with macroeconomic analyses of civil war that point to low-per capita income as a very robust explanatory factor in determining the risk of violent internal conflict breaking out (Collier and Hoeffler, 1998; Fearon and Laitin, 2003). Our result may be driven by the type of conflict we analyze in this paper since the determinants of civil unrest may differ significantly from those of civil wars and more violent forms of conflict. It may also be due to the fact that other controls are in place in table 5. In particular, we control explicitly for poverty levels, which are positively correlated with civil unrest across India. The magnitude of this effect varies very little across all model specifications. The desegregation of the poverty measures by rural and urban areas (column 3) suggests that the result is driven mostly by rural poverty.²⁰ This could be a result of the size of the rural sector across all Indian

²⁰ The aggregated inequality and poverty measures were calculated from rural and urban coefficients weighted by rural and urban populations in each state as provided by the Indian Census.

states. Most Indians live in the rural sector and thus our models are more likely to better capture the impact of events that take place in rural areas than in urban areas. These results seem to suggest that it is not low income per se that leads to the outbreak of conflicts but rather the extent of poverty. Once we control for poverty explicitly both variables become positively associated with civil unrest. The likely interpretation of this result is that while poverty increases discontent amongst some population groups, richer states may offer attractive predatory opportunities, i.e. rioters in richer states may have more to gain from episodes of civil unrest than in poorer states.

5. Concluding remarks

Civil unrest entails important social and private costs, and can represent the prelude to more violent conflicts, including civil wars. Yet, at present, we have little understanding of what generates civil unrest and what can be done to prevent and/or reduce it. This paper takes a significant step towards the systematic understanding of the role of redistributive transfers in the reduction and prevention of civil unrest and its merits in relation to policies of more direct intervention in a dynamic two-period setting. The paper develops a conceptual framework for the analysis of important intertemporal trade-offs in the relationship between redistributive transfers, policing and civil unrest. This framework models choices faced by decision-makers in an unequal, highly polarized society, where social discontent gives rise to civil unrest, where conflict tends to self-perpetuate once it starts and the population is subject to a repression threshold. We find that in societies with a high propensity for civil unrest, instability will only decrease when the marginal impact of transfers on civil unrest is higher than the marginal impact of policing. In the absence of a redistributive transfers system, these societies will only be able to avoid the escalation of conflict if they can afford indefinitely higher levels of

policing. Societies with a lower propensity to civil unrest will be able to avoid the escalation of instability if a system of minimum transfers is in place. These findings are supported by empirical evidence based on data on riots collected for a panel of fourteen Indian states for the period between 1973 and 1999.

Theoretical models are only as valid as the assumptions used to construct them. The empirical estimations in this paper allowed us to assess the validity of the main propositions of the conceptual framework, as well as evaluate the relative short- and long-term impacts of transfers and policing on rioting in India between 1973 and 1999. The Indian data provides strong support for the assumptions that form the main blocks of our conceptual framework, i.e. on the self-perpetuation of civil unrest, on the negative impact of redistributive transfers on civil unrest and on the existence of a repression threshold. The results show further that policing is only at best a short-term instrument in the fight against civil unrest. In the medium-term it may trigger further social discontent and unrest. In the medium-term, redistributive transfers are a more successful and cost-effective tool for reducing conflict. This is due to their preventive nature: redistributive transfers address directly distributional concerns that may cause social discontent. In addition, they contribute towards the socio-economic protection of the most vulnerable groups of the population and the reduction of poverty, which has been shown to impact significantly on the onset of civil unrest in India.

Our empirical results are robust to different model specifications and are particularly significant when the relationship between redistribution, policing and conflict is analyzed within an endogenous framework. This is an important contribution of the paper. Although some types of conflict can be treated as external to local economic decisions, local animosities and social divides are likely to be an endogenous cause of civil unrest, as local conflicts may

simultaneously be a cause and a consequence of the welfare characteristics of their instigators. Failure to address the endogenous nature of conflict may underestimate the significance of redistributive transfers for the reduction and prevention of civil unrest.

We believe the results of this paper yield important lessons for other countries where social cohesion tends to break frequently but large-scale wars may be avoidable. Some countries in Latin America, such as Brazil, Mexico and Peru, have exhibited a combination of high income inequalities (much higher than India's) and high potential for socio-political conflict (Binswanger, Deininger and Feder, 1995), while other countries have shown signs of deterioration of previously successful social development policies (for instance, former Soviet Union republics). This may result in increases in civil unrest. The implementation of adequate programs of redistributive transfers may have an important role to play in the establishment and/or maintenance of stable socio-political environments in those countries. Further empirical analyses of these relationships should remain on the agenda of future research on the economics of civil conflicts. In particular, the empirical analysis presented in this paper suggests two significant paths for further analysis that at the present moment are hampered by limitations in existing datasets at national and regional level in countries affected by civil conflicts. First, we need to understand better the motivations for civil unrest, rioting and other forms of civil insurrections. Testing the validity of the conceptual framework proposed in this paper would be greatly enriched by disaggregating riots according to different underlying motivations. This requires a large effort in terms of data collection at national or even sub-national level in India, and elsewhere. Second, we need also more realistic assumptions on and forms of quantifying the individual costs and benefits of engaging in civil unrest (for group B) and of either accommodating social demands or repressing them (for group A). This requires the use of datasets with specific information on direct indicators of conflict at the individual or household

level. Important bodies of research in sociology, psychology, anthropology and political science have provided valuable insights into these two issues. Advances in research into the economics of civil conflicts would greatly benefit from combining these insights with data collection efforts at national and sub-national levels in conflict settings.

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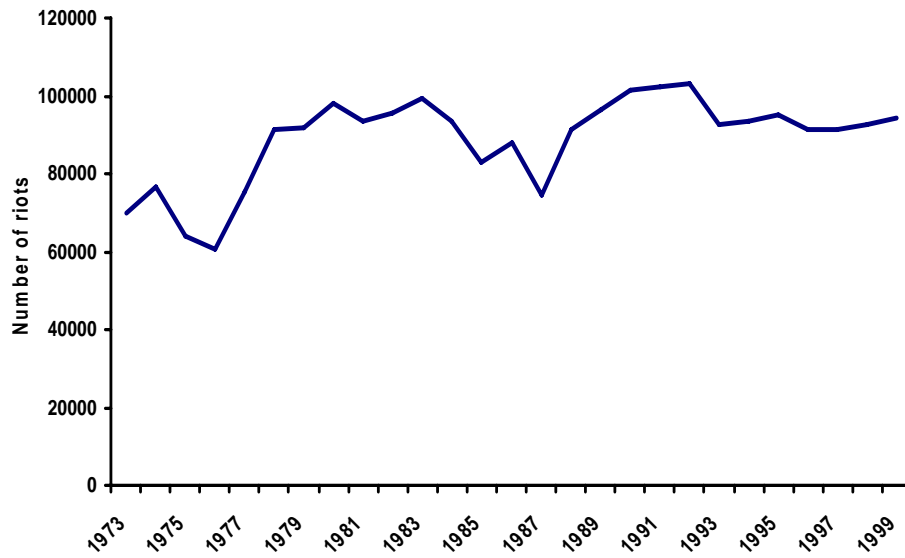
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TABLE 1: σ and λ in India, 1973 to 1999

	1977	1983	1987	1993	1999
σ	-0.011	0.067	-0.072	-0.014	-0.055
λ	0.030	0.079	-0.002	0.017	0.064
Scenario	2	2	1	2	2

Source: Results from OLS estimation of equation (2). Standard errors are robust and clustered by state. Regression includes constant as in equation (2).

FIGURE 1: Incidence of Riots in India, 1973 to 1999



Source: Government of India, *Crime in India* (New Delhi: National Crime Records Bureau, Ministry of Home Affairs, various years).

TABLE 2: Policing and Social Expenditure in Selected Indian States, 1973 and 1999

	Police strength			Expenditure on social services		
	1973	1999	%Δ73-99	1973	1999	%Δ73-99
Andhra Pradesh	0.98	0.99	1.02	85.7	151.8	77.13
Assam	1.66	2.03	22.29	203.7	31.6	-84.49
Bihar	0.85	0.97	14.12	56.2	145.0	158.01
Gujarat	1.54	1.28	-16.88	106.6	227.8	113.70
Karnataka	1.25	0.99	-20.80	153.0	194.1	26.86
Kerala	0.96	1.18	22.92	227.0	184.0	-18.94
Madhya Pradesh	1.33	1.24	-6.77	81.4	52.2	-35.87
Maharashtra	1.49	1.52	2.01	183.2	285.5	55.84
Orissa	1.04	0.99	-4.81	113.9	50.3	-55.84
Punjab	1.70	3.02	77.65	137.2	66.3	-51.68
Rajasthan	1.40	1.24	-11.43	105.0	129.3	23.14
Tamil Nadu	1.00	1.30	30.00	166.5	226.0	35.74
Uttar Pradesh	1.47	0.99	-32.65	77.9	31.3	-59.82
West Bengal	1.44	1.99	38.19	101.6	215.3	111.91
India	1.29	1.41	9.30	128.5	142.2	10.66

Source: Data on police from Government of India, *Crime in India* (New Delhi: National Crime Records Bureau, Ministry of Home Affairs, various years). Data on social services expenditure published by the Reserve Bank of India, *Bulletin* (New Delhi, various years).

Notes: Police strength refers to the number of civil plus armed police per 1000 people. Expenditure on social services refers to annual real expenditure per capita at 1980-81 constant prices in rupees.

TABLE 3: Correlation Coefficients for Rioting in India, 1973 to 1999

	Lag transfers T_{t-1}	Police P_t	Lag police P_{t-1}	Riots per 1000 people (mean, sd)
Andhra Pradesh	-0.884***	-0.634**	-0.409*	0.060 (0.015)
Assam	-0.766***	-0.507*	-0.270	0.223 (0.094)
Bihar	-0.464**	-0.179	-0.215	0.172 (0.041)
Gujarat	-0.053	-0.467**	0.487**	0.035 (0.016)
Karnataka	0.556**	-0.173	-0.295	0.133 (0.030)
Kerala	0.215	-0.593**	0.288	0.209 (0.026)
Madhya Pradesh	-0.771**	-0.065	-0.461**	0.063 (0.022)
Maharashtra	-0.026	-0.214	-0.345	0.052 (0.034)
Orissa	-0.775***	-0.049	-0.067	0.067 (0.021)
Punjab	-0.413**	-0.543**	-0.746***	0.003 (0.003)
Rajasthan	-0.001	-0.883***	-0.039	0.285 (0.060)
Tamil Nadu	-0.655***	-0.408*	-0.359	0.135 (0.032)
Uttar Pradesh	-0.976***	0.435**	0.503**	0.087 (0.040)
West Bengal	-0.958***	0.244	0.285	0.142 (0.069)
India	-0.457***	-0.205	-0.150	0.118 (0.016)

Source: Own calculations from published data from Reserve Bank of India, *Bulletin* (New Delhi, various years) and Government of India, *Crime in India* (New Delhi: National Crime Records Bureau, Ministry of Home Affairs, various years).

Note: ***, ** and * indicate, respectively, statistically significance at the 1%, 5% and 10% level.

TABLE 4: Descriptive Statistics: Means and Standard Deviations

	Andhra Pradesh	Assam	Bihar	Gujarat	Karnataka	Kerala	Madhya Pradesh
1. Volume of riots	0.060 (0.015)	0.223 (0.094)	0.172 (0.041)	0.035 (0.016)	0.133 (0.030)	0.209 (0.026)	0.063 (0.022)
2. Number of police	0.946 (0.098)	1.994 (0.608)	0.931 (0.105)	1.544 (0.212)	1.098 (0.113)	1.090 (0.242)	1.373 (0.212)
3. Headcount (%)	36.561 (13.929)	38.826 (10.307)	20.755 (11.007)	39.837 (15.802)	42.249 (13.657)	39.403 (17.940)	51.289 (10.695)
4. Rural poverty (%)	36.020 (16.016)	40.987 (10.016)	16.689 (12.589)	40.543 (16.432)	43.522 (15.105)	38.927 (18.429)	52.367 (11.324)
5. Urban poverty (%)	38.030 (8.693)	21.520 (14.291)	47.623 (9.060)	38.487 (15.108)	39.407 (11.133)	40.730 (17.271)	47.715 (8.816)
6. Exp social services	4.130 (0.988)	3.845 (1.076)	3.618 (0.116)	4.316 (0.908)	4.332 (0.930)	17.906 (6.287)	3.762 (0.800)
7. State product	7.446 (0.274)	7.257 (0.135)	6.894 (0.116)	7.781 (0.338)	7.568 (0.330)	7.407 (6.287)	7.278 (0.230)
8. School enrolments	0.145 (0.058)	0.177 (0.0515)	0.117 (0.032)	0.134 (0.058)	0.174 (0.039)	0.167 (0.072)	0.140 (0.050)
9. Congress majority	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)
	Maharashtra	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	West Bengal
1. Volume of riots	0.052 (0.034)	0.067 (0.021)	0.003 (0.003)	0.285 (0.060)	0.135 (0.032)	0.087 (0.040)	0.142 (0.069)
2. Number of police	1.550 (0.100)	1.086 (0.142)	2.161 (0.584)	1.297 (0.092)	1.108 (0.149)	1.204 (0.229)	1.307 (0.240)
3. Headcount (%)	48.189 (14.132)	52.094 (8.243)	19.340 (8.747)	43.508 (14.926)	43.863 (12.657)	21.114 (5.797)	39.933 (12.849)
4. Rural poverty (%)	53.547 (18.523)	52.315 (8.359)	19.048 (8.359)	45.523 (16.232)	46.235 (15.294)	14.869 (8.128)	43.757 (14.571)
5. Urban poverty (%)	39.698 (8.152)	50.663 (7.849)	20.035 (10.979)	36.712 (11.795)	39.290 (10.559)	46.338 (12.329)	29.843 (9.522)
6. Exp social services	4.554 (0.971)	3.947 (0.906)	4.198 (0.811)	4.107 (0.879)	4.410 (1.013)	3.629 (0.774)	4.228 (0.907)
7. State product	7.995 (0.396)	7.245 (0.141)	8.064 (0.294)	7.338 (0.187)	7.567 (0.362)	7.257 (0.207)	7.634 (0.302)
8. School enrolments	0.172 (0.055)	0.134 (0.057)	0.147 (0.048)	0.125 (0.058)	0.179 (0.065)	0.121 (0.050)	0.149 (0.027)
9. Congress majority	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)	0.667 (0.516)

Note: Standard deviations in brackets.

Source: Own calculations based on data published by the following sources: 1. 2. Government of India (GOI), *Crime in India* (New Delhi: National Crime Records Bureau, Ministry of Home Affairs, various years). 3. 4. 5. 1973-74 to 1993-94 data from Özler, Datt and Ravallion (1996), World Bank. 1999-2000 headcount indices from Deaton (2001). 6. 7. GOI, *National Accounts Statistics* (New Delhi: Central Statistical Organisation, Department of Statistics, Ministry of Planning and Programme Implementation, various years). 8. GOI, *Education in India* (New Delhi: Ministry of Education, various years). 9. GOI, Indian Election Commission.

TABLE 5: Empirical results – marginal effects

	(1) Volume riots FE	(2) Volume riots FE [with controls]	(3) Volume riots FE [with controls] [rural/urban]	(4) Volume riots GMM	(5) Volume riots 2SLS
Lagged riots	0.390** (2.55)	0.342** (2.14)	0.334** (2.23)	0.342* (0.55)	0.341** (2.41)
Use of police	-0.046 (1.11)	-0.053* (1.74)	-0.053* (1.90)	-0.124** (1.98)	-0.053** (1.97)
Lagged use of police	0.023 (0.94)	0.040* (2.13)	0.042** (2.17)	0.006 (0.24)	0.040* (1.51)
Exp social services (log)		-0.003*** (4.16)	-0.004* (1.81)	-0.003* (1.79)	-0.004*** (2.93)
Lagged exp sservices (log)	-0.023 (0.31)	-0.121 (1.31)	-0.121 (1.18)	-0.105** (2.33)	-0.121** (1.86)
Lagged headcount		0.003* (2.07)		0.004*** (3.51)	0.003** (2.45)
Lagged rural poverty			0.003** (2.21)		
Lagged urban poverty			0.001 (0.41)		
Natural log state income		0.153* (1.74)	0.154* (1.77)	0.217*** (4.60)	0.153** (2.08)
School enrolments		-0.094 (0.92)	-0.093 (0.81)	-0.033 (0.25)	-0.091 (1.12)
Openness measure		0.006 (0.31)	0.010 (0.30)	-0.428*** (3.04)	0.006 (0.41)
Congress majority		0.033 (1.38)	0.037 (1.01)	(dropped)	-0.006 (0.44)
Constant	0.221 (0.41)	-0.471 (1.04)	-0.584 (0.80)	0.170*** (3.00)	-0.247 (1.21)
Number of observations	70	70	70	56	70
R-squared	0.885	0.913	0.916		0.913
F-test instruments (Pr > F)					53.38 (0.000)
Sargan test χ^2 (Pr > χ^2)				6.63 (0.676)	
First-order autocorrelation (Pr > z)				-0.58 (0.562)	
Second-order autocorrelation (Pr > z)				-1.20 (0.232)	

Note: Absolute values of t-statistics in parenthesis. ***, ** and * indicate, respectively, statistical significance at the 1%, 5% and 10% level. State and year effects present in all columns. Errors reported in columns 4, 5 and 6 are those based on the second step results.