From Rags to Rifles: The Economics of Deprivation, Conflict and Welfare State

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Abstract

Historical evidence has taught us that it is often the poorest and most deprived people in unequal societies who are recruited to fight in civil wars. The present contribution constructs a theoretical model of the choice between appropriation and production, where conflict is represented as mutual stealing. Fully specified production functions allow for both symmetrical outcomes and for introducing inequalities in abilities and endowments. It is shown that people with lower marginal returns to productive activities due to lower ability, fewer endowments or discrimination are more likely to choose appropriative activities. Further, it is examined theoretically under what conditions welfare state policies such as redistribution of income and capital, as well as education, health and poverty-alleviation spending, can lead to less appropriative activities. Finally, the model's implications are tested empirically using logit estimations.

JEL Classification: D02, D74, H50, I30.

Keywords: Conflict, deprivation, welfare state, poverty, appropriative activities.

1 Introduction

History has shown us that people lacking opportunities for escaping poverty are associated with civil wars, civil unrest, warlordism and other forms of political violence. For example, in countries such as South Africa, Rwanda, Guatemala, Nicaragua, El Salvador or Iran deprivation and inequality played a major role in the occurrence of political violence during the last century (cf. Muller and Seligson, 1987, for a discussion). If the marginal gain from political violence

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(and appropriative activities[1] in general) is greater than the marginal gain of joining the regular market economy, people have incentives to join warlords or guerilla movements.

Of course, political and religious ideologies and the potential of organising rebellion also matter in conflicts, but grievances such as poverty and inequality make people more vulnerable to extremist doctrines and more easily recruitable by warlords. Thus, these different explanatory factors of conflict are not substitutes, but complements.

The present contribution aims to explain, with the help of a game-theoretic model, the role played by deprivation in the occurrence of conflict, if property rights protection is imperfect. It will also be shown under what conditions welfare state institutions can lower the risk of appropriative conflict.

This contribution builds on the growing theoretical literature in economics of conflict and rent-seeking (cf. for example Schelling, 1960; Skaperdas, 1992; Hirshleifer, 1995; Baker, 2003; Mehlum, Moene and Torvik, 2006).

The literature on the welfare state is also relevant for the present paper. Most economic contributions have emphasised the impact of the welfare state on distorted incentives and on decreased competitiveness (cf. for example Agell, 1996; Alesina and Perotti, 1997; Lindbeck, Nyberg and Weibull, 1999).

The results of several empirical studies indicate that it makes sense to link, as is done in my present contribution, the issues of conflict, deprivation, inequality and welfare state institutions: Inequality (Muller and Seligson, 1987; Deininger, 2003), poverty (Collier and Hoeffler, 2004; Fearon and Laitin, 2003) and lack of education (Deininger, 2003) have been found to increase the risk of conflict and crime. Justino (2005) has found that redistributive policies have been effective in reducing unrest on the local level in India.

Despite these empirical results, only relatively few theoretical models focusing on those issues have been built. The contributions of Grossman (1995), Azam (2001) and Noh (2002) examine the deterrent effect of income transfers on appropriative activities. Brito and Intriligator (1985) link the possibility of avoiding inter-state wars through resource transfers with the issue of imperfect information, and Grossman (1994) puts emphasis on the fact that land reforms can result in less appropriative activities.

However, most of these interesting contributions use a Grossman-style model in which the inequality between the two types of players is inherent in the model. As the roles, for example, predator versus prey, or landowner versus peasant families, are assigned from the beginning, these models cannot account for a symmetric outcome, with all players choosing some part of appropriative activities. Moreover, these models focus on one policy issue at a time and

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[1] As defined in the present contribution, appropriative activities include actions taken with the aim of altering the existing distribution of social wealth in favour of the player who takes the action. In the present contribution the focus lies on appropriation related to civil wars.

do not allow for considering the impact of various welfare state institutions within one single model. Furthermore, these contributions focus mainly on income transfers, but do not treat other welfare state policies such as capital redistribution[2], education[3], health policy and anti-poverty-programmes.

Thus, there is still an important need for further research linking the issues of conflict and the welfare state. The contribution of my present paper is of three kinds: First, I will build a conflict model which will allow for symmetrical outcomes and which will include a fully specified production function, enabling us to consider the impact of several distinct welfare state policies at the same time. Second, I will not only focus on income taxation, but I will as well analyse the cases of capital redistribution, education spending, health policy and anti-poverty-programmes, which have as far as I know rarely been discussed in the context of our research question. Third, the impact of different welfare state policies will be assessed empirically with the help of panel data for 155 countries and over a period of 40 years. Up to now most empirical research linking welfare state policies and conflict has been based on case studies.

The remaining part of the present contribution is organised as follows: Section 2 builds a simple model of appropriative conflict, section 3 focuses on the impact of different welfare state policies, and section 4 discusses some extensions to the basic model. Section 5 is devoted to an empirical test of the effects of welfare state policies on conflict and section 6 concludes.

2 The Model

Since for armed conflicts usually large groups of the population of a given country or region are involved, a 2-player framework seems appropriate. Each player represents the aggregate choice of individuals being part of two larger groups of the society. For example, one player could represent the black people, and the other player the white people. Alternatively, one player could correspond to educated people with a high ability, and the other player to illiterate people from poor rural areas.

We consider a population of two groups having the choice between productive (L) and appropriative (F) activities. As defined earlier, appropriative activities are unproductive, aim to alter the existing distribution of social welfare, and constitute a zero-sum-game. Thus, even though they may be utility maximising for a particular group, they are socially harmful and constitute a net deadweight loss on the level of the society as a whole.

There is only one output good, y, which is produced using two inputs, labour (L) and capital (K). Whereas L is the choice variable, K is assumed to be a given

[2] The model studying land reforms in Grossman (1994) is quite specifically designed for treating the factor of production "land". It cannot easily be generalised for other kinds of endowments, such as capital. Similarly, Brito and Intriligator's (1985) model focuses on the question of imperfect information, and is not designed for analysing the impact of welfare state policies, such as capital redistribution.

[3] Grossman and Kim (2003) link the issues of education and conflict. However, they focus on explaining differences across countries in educational policies.

endowment of capital and land.

Typically, the payoff of each group consists of the non-stolen part of its own production plus the part of the opponent's production which it steals. For simplicity, the appropriated part of the other group's production depends linearly on the time share a group spends on appropriative activities. I include a parameter ρ for group 1 (and θ for group 2) which represents a friction in the appropriation activity. The idea here is similar to the one of iceberg trade costs. A part of the stolen production from the other group is lost due to fighting or transportation to the predator country.

We have the following payoff (utility) functions for the two groups:

$$V_i = (1 - F_j)y_i + F_i y_j^{\rho} = L_j y_i + (1 - L_i)y_j^{\rho} \tag{1}$$

subject to the time constraint $L_i + F_i = 1$.

Moreover, we can include Cobb-Douglas production functions $y_1 = \alpha L_1^a K_1^b$ and $y_2 = \beta L_2^c K_2^d$, where α, β=total factor productivities; a,b,c,d=parameters. The functions show decreasing marginal returns for the choice variable L and for K, i.e. a<1,b<1,c<1,d<1. We get the following payoff function for group 1 (this is the same for group 2):

$$V_1 = L_2 \alpha L_1^a K_1^b + (1 - L_1)\beta^{\rho} L_2^{c\rho} K_2^{d\rho} \tag{2}$$

Setting $\frac{\partial V_i}{\partial L_i}$ equal to zero, we get the first order conditions (the second order conditions hold). Reformulating, the following expression is obtained for group 1 (it is similar for group 2):

$$L_1 = \left(\frac{\alpha a}{\beta^{\rho}}\right)^{\frac{1}{1-a}} K_1^{\frac{b}{1-a}} K_2^{\frac{-d\rho}{1-a}} L_2^{\frac{1-c\rho}{1-a}} \tag{3}$$

Given the time constraint, the labour time is bounded between 0 and 1, i.e. $0 \leq L_i \leq 1$.

The higher the total factor productivity and the bigger the capital endowment of a group, the greater proportion of its time will be spent for productive activities. This corresponds to the argument mentioned earlier, that in unequal societies the group with a lower total factor productivity or a lower capital endowment will be induced to spend a substantial fraction of its time for appropriative activities. Further, we can also see that if poor countries get richer on the whole (parallel increase in α and β), the level of productive activities increases (as $\rho < 1$), and accordingly appropriation decreases.

The prediction of the model that higher total factor productivity results in lowered incentives for engaging in civil conflict is challenged by the recent empirical findings of Krueger and Maleckova (2003) and Berrebi (2003) who study the personal characteristics of terrorists of Hamas, PIJ and Hezbollah, as well as attitudes towards terrorism in several Arabic countries. They argue that a higher education level does not result in a more negative view of terrorism. Also, they find no or even a positive association between education and the likelihood

of engaging in terrorism. The first finding of education not moderating political views does not conflict with our theoretical model, which contains no predictions about political preferences. Also the second finding of terrorists having more than an average education challenges our model less than what one could initially believe.

First, terrorism is not civil war. Both the theoretical and empirical literature on civil war varies considerably from that on terrorism, and one should not expect a model of civil war to account for empirical regularities concerning terrorism. As pointed out by Azam (2005), education could raise sensitivity to future generation's welfare, and thus make it more likely that people choose to make the "inter-generational investment of sucide-bombing". It would be difficult to argue that the decision of engaging in civil wars is driven by such considerations. Collier and Hoeffler (2004) show that factors related to greed and immediate rents play a salient role in explaining conflict onsets.

Second, the likelihood of engaging in terrorism could simply reflect individual selection and not aggregate choice effects. As acknowledged by Krueger and Maleckova (2003) themselves, the positive relationships between education and engaging in terrorism could simply be due to an excess supply of volunteers and the terrorist organisation picking the most skilled. In this case, raising the general education level would by no means lead to more terrorism and conflict.

Third, there is ample evidence that schooling in countries like Palestine includes a strong element of indoctrination, hate campaigns and misinformation (Berrebi, 2003; Gentzkow and Shapiro, 2004). Thus, it is hardly surprising that in such a context a positive relationship between years of schooling and support for terrorism can be found. In our theoretical model we focus on ideologically unbiased education that results in a higher total factor productivity. Clearly, the present model does not predict that indoctrination and misinformation reduces conflict.

For describing graphically the Nash equilibria we can, without loss of generality, first focus on a symmetrical case where $a = c, b = d, \alpha = \beta, \rho = \theta$. Figure 1[4] displays the reaction functions for particular values of the different parameters. We will first consider the case of a fighting-trap. For $\left(\alpha^{1-\rho}a\right)^{\frac{1}{1-a}} K_i^{\frac{b}{1-a}} K_j^{-\frac{d\rho}{1-a}} < 1$ (as in the case of the dotted curves RF1 and RF2), there is only one single Nash equilibrium, (0,0). If group 1's (black) reaction function rotates towards the north-west, and group 2's (grey) reaction function rotates towards the south-east, we will eventually end up in the case where $\left(\alpha^{1-\rho}a\right)^{\frac{1}{1-a}} K_i^{\frac{b}{1-a}} K_j^{-\frac{d\rho}{1-a}} = 1$, with the two Nash equilibria (0,0) and (1,1). This corresponds to the solid lines RF1' and RF2'. The outcome (1,1) is Pareto-superior to (0,0). Continuing to rotate the reaction functions further (not displayed in figure 1) will lead to the case where $\left(\alpha^{1-\rho}a\right)^{\frac{1}{1-a}} K_i^{\frac{b}{1-a}} K_j^{-\frac{d\rho}{1-a}} > 1$. In this situation we obtain three Nash

[4] Case 1: a=0.5, b=0.5, $\rho = 0.5$, $\alpha = 2$, $K_1 = 1$, $K_2 = 1$. The black dotted line is the reaction function of group 1 (RF1), whereas the grey dotted line refers to the reaction function of group 2 (RF2). Case 2: a=0.5, b=0.5, $\rho = 0.5$, $\alpha = 4$, $K_1 = 1$, $K_2 = 1$. The black solid line represents the reaction function of group 1 (RF1'), the grey solid line corresponds to the reaction function of group 2 (RF2').

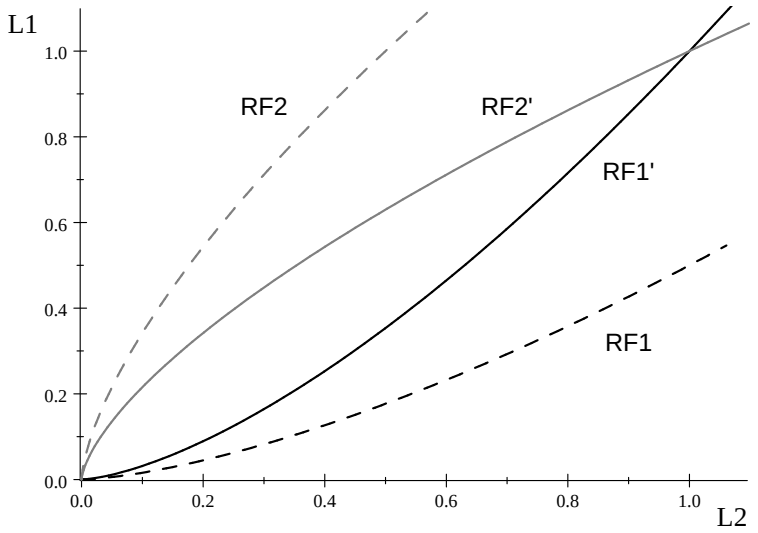

Figure 1: Reaction functions for different parameter values

equilibria, (0,0), (1,1), and an intermediate one. Figure 2 describes the basins of attraction for the case with three equilibria[5].

The two extreme value equilibria E', (0,0), and E", (1,1), in figure 2 are stable, whereas the intermediate equilibrium E"' is unstable. Towards the south-west of the intermediate equilibrium is the basin of attraction of the "bad" equilibrium E', (0,0), and in the north-east of the intermediate equilibrium is the basin of attraction of the "good" equilibrium E", (1,1). The more RF1 rotates to the north-west and the more RF2 rotates to the south-east, the more the intermediate equilibrium E"' moves to the south-west. This results in the basin of attraction of the "bad" equilibrium becoming smaller and the basin of attraction of the "good" equilibrium becoming larger.[6]

[5] For fully characterising the out-of-equilibrium dynamics, a dynamic model with differential equations is needed. Deriving a dynamic version of our static model is straightforward. Assuming that the labour time of group 1 increases linearly in the difference between the marginal returns to productive activities and to appropriative activities, we obtain: $\dot{L_1} = \zeta(L_2 \alpha a L_1^{a-1} K_1^b - \beta^\rho L_2^{c\rho} K_2^{d\rho})$, where ζ=parameter related to the speed of adjustment. It is analogous for $\dot{L_2}$. Putting $\dot{L_1} = \dot{L_2} = 0$, we obtain the equilibrium lines that are identical to the reaction functions of the static model. The equilibria correspond to the intersection of the equilibrium lines. A similar modelling approach for making a static model dynamic is used and discussed in more detail in Rohner and Frey (2007).

[6] For our kind of setting with strategic complementarities, the issue of equilibrium selection can easily be treated in a more explicit way using global games. In Rohner and Frey (2007) it is shown that, for a similar model structure, the results from comparative statics are identical for an explicit equilibrium selection model using global games and for an approach based on shifts in the reaction functions and basins of attractions, as is done in the present contribution.

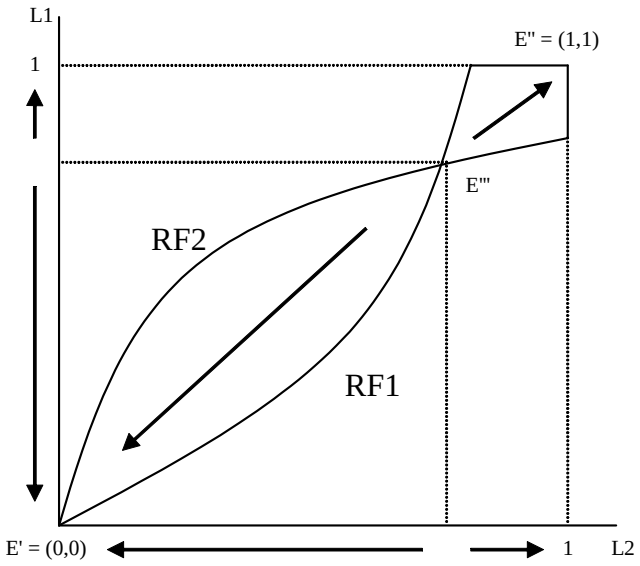

Figure 2: Basins of attraction for the case of three equilibria

The focus in the next section lies on how to achieve the "good" outcome (1,1), if the country is initially stuck in the "fighting-trap" (0,0). Therefore, it is assumed that at first $\left(\alpha^{1-\rho}a\right)^{\frac{1}{1-a}} K_i^{\frac{b}{1-a}} K_j^{-\frac{d\rho}{1-a}} < 1$. It will be shown that under certain conditions welfare state policies rotate group 1's reaction function towards the north-west, and group 2's reaction function towards the south-east in figure 1. If the policy shock is big enough, it becomes possible to achieve multiple equilibria, whereas (0,0) is still possible, but (1,1) is now a potential outcome as well. Thus, the framework becomes a "coordination"-game. Further, as seen before, the more RF1 rotates to the north-west and RF2 rotates to the south-east, the smaller becomes the basin of attraction of the "bad" equilibrium and the larger becomes the basin of attraction of the "good" equilibrium. In this case the likelihood of ending up in a "fighting-trap" decreases, and the good outcome (1,1) is more likely to be achieved.

As explained above, rotations of RF1 to the north-west and of RF2 to the south-east are always a good thing in terms of political stability. Therefore, for the comparative statics section it is most convenient to focus on the rotations. However, for the sake of completeness, we can compute the value of the intermediate Nash equilibria, by plugging one reaction function into the other. The intermediate equilibrium for L_1 is given by equation (4) (this is analogous for group 2).

$$L_1 = \left[\left(\frac{\alpha a}{\beta^{\rho}} \right)^{\frac{1}{1-a}} \left(\frac{\beta c}{\alpha^{\theta}} \right)^{\frac{1-c\rho}{(1-a)(1-c)}} K_1^{(\frac{b}{1-a} - \frac{b\theta(1-c\rho)}{(1-a)(1-c)})} K_2^{\frac{d(1-\rho)}{(1-a)(1-c)}} \right]^{\frac{1}{1-\frac{(1-a\theta)(1-c\rho)}{(1-a)(1-c)}}} \tag{4}$$

The present analysis is based on the framework of a static game. If the game were to be repeated, cooperation could be fostered through strategies such as "grim strategy" or "tit-for-tat".

3 Comparative Statics of Welfare State Policies

In this part we will focus on the impact of different welfare state policies on the groups' decisions between productive and appropriative activities. We should note that the first-best policy would be the enforcement of property rights, eliminating appropriative activities altogether. Accordingly, welfare state institutions represent only a second-best policy that becomes important when property rights protection is imperfect.

The analysis of the present section builds on the assumption that the state in question can raise taxes and assure redistribution, but is not able to fully secure property rights. For many developing countries such an assumption is reasonable, as states can be "strong" with respect to one policy dimension, but "weak" with respect to the other dimension.

In countries such as Sri Lanka, Colombia, Brazil or Nigeria raising taxes and conducting fiscal and welfare state policies is possible. The presence of rebel groups in some of those countries makes the collection of taxes more difficult in some regions than in others, but larger firms cannot escape taxation independently of their location. Also, some kinds of taxes, such as export taxes or import tariffs (which *de facto* at least partially reduce the surplus of the domestic firms) can be levied quite independently of the ongoing conflict.

At the same time the effective protection of property rights is not assured, at least in large parts of those countries. In many areas the slender police and army forces do not even dare to enter, and in others an effective protection of property rights is made impossible by the poor law system. Even in parts of some OECD-countries property rights are not effectively protected (e.g. Chiapas in Mexico or some parts of Southern Italy), although taxation is possible.

We can regard the society as being composed of two types of groups: One "high productivity" and one "low productivity". Several reasons could be invoked for the "low productivity" group getting a lower payoff per invested amount of labour time: First, the total factor productivity α (respective β) could be lower due to natural (genetic) abilities, such as talent or intelligence, or due to discrimination against ethnical or religious minorities (i.e. greater difficulties in getting an appropriate job). Similarly, family background (wealth, class) could be a reason for the different productivities. Children from rich families could receive a better education in private schools rather than in state schools, which would help them develop better abilities for producing.

Second, the lower return to labour for the "low productivity" group could be due to smaller capital endowments. Being from a rich family would result in a bigger availability of capital. As capital is included in the production function, there is a higher marginal productivity of labour for a higher amount of capital (as stated in standard neoclassical economic theory).

In the framework of our model, the "low productivity" group would typically have higher incentives than the "high productivity" one for choosing appropriative activities. Welfare state policies could prevent the "low productivity" group from fighting.

3.1 Income Taxation for Transfers

First, we will focus on transfers from the high income group to the low income group by the means of proportional income taxation at a rate t. The tax revenue is used for the provision of (non-appropriable) public goods and services that benefit both groups to an equal extent. For simplicity, it is assumed that each group receives public goods and services of the amount $\frac{t(y_1+y_2)}{2}$.[7] Given that each group contributes different amounts of tax payments but receives the same level of public goods and services in return, this setting corresponds to net transfers from the high income group to the low income group.

The timing is as follows. First, groups decide how much labour time they want to invest in production. Then, the state taxes a proportion t of the total production income of both groups. Finally, the groups appropriate a part of the disposable output of the opponent (where $F_i = 1 - L_i$) and the state provides its goods and services. The payoff function of group 1 becomes (it is analogous for group 2):

$$V_1 = L_2(1-t)y_1 + (1-L_1)\left[(1-t)y_2\right]^{\rho} + \frac{t(y_1+y_2)}{2} \tag{5}$$

Introducing the production function in (5), we obtain:

$$V_1 = L_2(1-t)\alpha L_1^a K_1^b + (1-L_1)(1-t)^{\rho}\beta^{\rho} L_2^{c\rho} K_2^{d\rho} + \frac{t(\alpha L_1^a K_1^b + \beta L_2^c K_2^d)}{2} \tag{6}$$

From the first order conditions follows reaction function (7) for group 1 (for group 2 the result is similar):

$$L_1 = \left[\frac{\alpha a K_1^b}{\beta^{\rho} L_2^{c\rho} K_2^{d\rho}}\right]^{\frac{1}{1-a}} \left[\frac{(1-t)L_2 + \frac{t}{2}}{(1-t)^{\rho}}\right]^{\frac{1}{1-a}} \tag{7}$$

Taking the first derivative of (7) with respect to t, we can see under what conditions more income taxation leads to more or less appropriative activities. As we are interested in the direction of the shift of the reaction function, we

[7] The results are robust to alternative ways of modelling public goods and service provision.

have to focus on the change in L_1 for a change in t, holding L_2 constant at a given level. The approach will be similar in the other subsections.

$$\frac{\partial L_1}{\partial t} = (\frac{1}{1-a})\left[\frac{\alpha a K_1^b}{\beta^\rho L_2^{c\rho} K_2^{d\rho}}\right]^{\frac{1}{1-a}} \left[\frac{(1-t)L_2 + \frac{t}{2}}{(1-t)^\rho}\right]^{\frac{a}{1-a}} \left[\frac{\frac{1}{2} - (1-\rho)L_2 + \frac{t\rho}{2(1-t)}}{(1-t)^\rho}\right] \tag{8}$$

Whether the expression (8) is positive or negative depends exclusively on the numerator of the last term in (8) (as all other terms are unambiguously positive). Thus, we get the following proposition:

Proposition 1 *A greater income transfer from the better-off to the worse-off group through increased income taxation has a positive impact on the producing time of a given group 1 (rotates his reaction function towards north-west in figure 1) if* $\frac{1}{2} - (1-\rho)L_2 + \frac{t\rho}{2(1-t)} > 0$*, i.e. for a low* L_2*, for a high* ρ *and a high t.*

Proof. Follows from the discussion above. ■

For a high ρ, which corresponds to a low friction of stealing, more redistribution decreases the incentives for appropriative activities. Intuitively, if a group knows that it will get a substantial part of the other group's production through redistribution, it will have less incentives to steal. For a very low ρ, stealing becomes in any case less of an issue, and the dominant impact of a rise in taxes are the reduced incentives for productive activities.

The situation is similar for the level of L_2. If we are in a fighting-trap (low level of L_2), the disincentives of stealing dominate, whereas if a country is doing well (high level of L_2), the disincentives of taxation on production effort dominate.

One can imagine the redistribution process as institutionalised "stealing" from the rich for giving it to the poor, managed by the state. Unlike redistribution through appropriative activities, redistribution through the state does not involve a friction cost of fighting and does not lead to an opportunity cost of time spent for appropriation. More formally, for a given amount M transferred from a better-off group 1 to a worse-off group 2, the beneficiary (group 2) prefers redistribution through the welfare state rather than through appropriation, as in the former case group 2 receives the full amount M and has freed time for productive activities, while in the latter case group 2 only receives an amount M'<M (due to the friction of fighting). Group 1 loses under both mechanisms an amount M and is indifferent. Thus, redistribution through the welfare state of a given amount M is Pareto-superior to appropriation, as at least one group is better off and no group is worse off.

We have not taken the increase in the demand for "leisure" and the administrative costs caused by redistribution (e.g. individuals must comply with

means-tested criteria, the need to travel long distances etc) into account. These factors can result in a deadweight loss.

An interesting variation of the policy of forfeit income transfers would be transfers dependent on the receiving group choosing a zero (or very low) level of appropriation. Such conditional transfers could enhance the incentives of behaving in a peaceful way.

Under what conditions does a government have incentives to implement a redistribution policy? The decision of a generally benevolent government is considered, whose utility function is a weighted combination of the utility functions of groups 1 and 2: $V_G = \varphi V_1 + (1-\varphi)V_2$, where φ=weight attributed to group 1. If the government is composed of only members of group 1 (resp., group 2), we would have $\varphi = 1$ (resp., $\varphi = 0$).

Would a government that is exclusively composed of members of group 1 ever have incentives for redistributing output or capital if group 1 happens to be the wealthier group? First, the case where $\left(\frac{\alpha a}{\beta \rho}\right)^{\frac{1}{1-a}} K_1^{\frac{b}{1-a}} K_2^{\frac{-d\rho}{1-a}} < 1$ and $\left(\frac{\beta c}{\alpha^{\theta}}\right)^{\frac{1}{1-c}} K_2^{\frac{d}{1-c}} K_1^{\frac{-b\theta}{1-c}} < 1$ should be considered. In this situation, the reaction functions only intersect once at the fighting equilibrium (0,0), which results in both groups and the government all receiving a payoff of zero, i.e. $V_1 = 0$, $V_2 = 0$, $V_G = 0$. Clearly, redistribution would be advantageous for everybody, at least up to the point when the reaction functions intersect a second time and (1,1) becomes feasible, i.e. where $\left(\frac{\alpha a}{\beta \rho}\right)^{\frac{1}{1-a}} K_1^{\frac{b}{1-a}} K_2^{\frac{-d\rho}{1-a}} = 1$ and $\left(\frac{\beta c}{\alpha^{\theta}}\right)^{\frac{1}{1-c}} K_2^{\frac{d}{1-c}} K_1^{\frac{-b\theta}{1-c}} = 1$. Thus, any government would have incentives to implement redistribution. From that point onwards a government that is mainly composed by members of the wealthier group would face a trade-off, as on one hand redistribution leads to direct losses of the better-off group, but on the other hand also reduces the risk of conflict. In order to treat this outcome more explicitly, we would have to explicitly address the issue of equilibrium selection, which we do not do due to space limitations.

3.2 Redistribution of Capital and Land

It has been shown in the literature that conflicts are often associated with land and asset inequality (André and Platteau, 1998; Deininger, 2003). However, it is controversial if and under what conditions reforms leading to a more egalitarian land distribution can reduce the risk of conflict. While many scholars argue that land reforms can reduce the scope for conflict (Grossman, 1994; Sweig, 2002), other scholars stress that in some cases land redistribution has either no effects or can even increase the risk of conflict due to enhanced competition (Alston, Libecap and Mueller, 2000; Bandiera, 2003). In the present subsection I would like to assess theoretically under what conditions capital and land redistribution can reduce the scope for conflict.

First, the effect of capital or land redistribution is assessed with the help of

the basic model[8]. As before, the groups are first treated as aggregate players. This assumption is realistic, when the intra-group inequality in capital endowments is relatively small, and differences between the groups are substantial. Each group's time spent for productive activities increases in its own capital and decreases in the opponent's capital. We can easily see this by taking for equation (3) the first derivative of L_1 with respect to K_1 (displayed in equation (9)) and K_2 (displayed in equation (10)). This is similar for the reaction function of the second group.

$$\frac{\partial L_1}{\partial K_1} = \left(\frac{b}{1-a}\right)\left(\frac{\alpha a}{\beta^\rho}\right)^{\frac{1}{1-a}} K_1^{\frac{a+b-1}{1-a}} K_2^{\frac{-d\rho}{1-a}} L_2^{\frac{1-c\rho}{1-a}} > 0 \tag{9}$$

$$\frac{\partial L_1}{\partial K_2} = \left(\frac{-d\rho}{1-a}\right)\left(\frac{\alpha a}{\beta^\rho}\right)^{\frac{1}{1-a}} K_1^{\frac{b}{1-a}} K_2^{\frac{a-d\rho-1}{1-a}} L_2^{\frac{1-c\rho}{1-a}} < 0 \tag{10}$$

Thus, the impact of capital redistribution in the present framework is ambiguous[9]. If capital is redistributed from group 1 to group 2, typically group 2 has smaller incentives for appropriative activities, but group 1's incentives for fighting increase. Simple capital transfers between large population segments do not appear to be an efficient policy for avoiding conflict when inter-group inequality in capital and land distribution prevails over intra-group inequality.

However, there is a caveat to this result, when not all capital is employed in production (due to limitations and constraints of the production technology), but a part of it is consumed. We can assume for now that there is a maximum amount of capital which the production technology allows for. Thus $K_i = K_i$ for $K_i < K^*$, and $K_i = K^*$ for $K_i \geq K^*$.

Assume that initially group 1 has excess capital: $K_1 = K^* + K_{EX}$, where K_{EX}=excess capital not employed in the production. For a policy that redistributes K_{EX} from group 1 to group 2, the employed capital K_1 remains constant ($K_1 = K^*$), while K_2 increases by an amount K_{EX}. The impact on L_1 equals $\frac{\partial L_1}{\partial K_2} = \left(\frac{-d\rho}{1-a}\right)\left(\frac{\alpha a}{\beta^\rho}\right)^{\frac{1}{1-a}} K_1^{\frac{b}{1-a}} K_2^{\frac{a-d\rho-1}{1-a}} L_2^{\frac{1-c\rho}{1-a}} < 0$. Group 1 produces less, as group 2 becomes a better prey due to an increased capital stock. For group 2, the effect equals $\frac{\partial L_2}{\partial K_2} = \left(\frac{d}{1-c}\right)\left(\frac{\beta c}{\alpha^\theta}\right)^{\frac{1}{1-c}} K_2^{\frac{c+d-1}{1-c}} K_1^{\frac{-b\theta}{1-c}} L_1^{\frac{1-a\theta}{1-c}} > 0$. If the

[8] The parameter K in the model captures both physical capital and land. Introducing an additional factor of production for land in the model would not affect the results.

[9] The impact of capital redistribution can be assessed in a more formal way. If the intermediate equilibrium moves to the south-west (which corresponds to a decrease of L_1 and L_2), the basin of attraction of the good equilibrium increases and the basin of attraction of the bad equilibrium decreases. This leads to a lower risk of conflict. Formally, this corresponds to the following condition for group 1. $L_1' = \left[\left(\frac{\alpha a}{\beta^\rho}\right)^{\frac{1}{1-a}}\left(\frac{\beta c}{\alpha^\theta}\right)^{\frac{1-c\rho}{(1-a)(1-c)}}(K_1+\Delta t)^{(\frac{b}{1-a}-\frac{b\theta(1-c\rho)}{(1-a)(1-c)})}(K_2-\Delta t)^{\frac{d(1-\rho)}{(1-a)(1-c)}}\right]^{\frac{1}{1-\frac{(1-a\theta)(1-c\rho)}{(1-a)(1-c)}}}$ $< L_1 = \left[\left(\frac{\alpha a}{\beta^\rho}\right)^{\frac{1}{1-a}}\left(\frac{\beta c}{\alpha^\theta}\right)^{\frac{1-c\rho}{(1-a)(1-c)}} K_1^{(\frac{b}{1-a}-\frac{b\theta(1-c\rho)}{(1-a)(1-c)})} K_2^{\frac{d(1-\rho)}{(1-a)(1-c)}}\right]^{\frac{1}{1-\frac{(1-a\theta)(1-c\rho)}{(1-a)(1-c)}}}$. For the second group it is similar.

parameter values of the two groups are similar, the second effect of $\frac{\partial L_2}{\partial K_2} > 0$ is stronger than the first one, $\frac{\partial L_1}{\partial K_2} < 0$. The intuitive reason for this is that appropriation involves a friction cost, i.e. $\rho < 1$. Therefore the increased incentives for production of the formerly capital-poor group 2 are not fully offset by the enhanced appropriation incentives of group 1. Mathematically, this is displayed in the equation below (for convenience and without loss of generality the parameter values are taken as symmetrical):

$$\left|\frac{\partial L_2}{\partial K_2}\right| - \left|\frac{\partial L_1}{\partial K_2}\right| = (1-\rho)\left(\frac{b}{1-a}\right)\left(\frac{\alpha a}{\beta^{\rho}}\right)^{\frac{1}{1-a}} K_1^{\frac{b-d\rho+a-1}{1-a}} L_2^{\frac{1-c\rho}{1-a}} > 0 \qquad (11)$$

Redistribution leads to a more substantial upward-shift of group 2's reaction function, and a more limited downward shift of group 1's reaction function. In this way the basin of attraction of the good equilibrium should usually increase. Thus, when a part of the capital of the capital-rich group is not fully employed in the production process, but consumed, capital and land redistribution can reduce conflict. Redistribution of capital that is not productively employed could take the form of a tax on certain luxury goods.

However, it is often argued that most of the capital and land inequality is intra-group rather than inter-group. For such a setting it makes sense to disaggregate the population groups facing each other. For simplicity we can assume that both groups are of a similar size[10]. Thus, both group 1 and group 2 are composed of n individual players each. For keeping the collective action issues as simple as possible, we further assume that each player of group 1 matches with a randomly assigned player of group 2. To show that capital and land redistribution can reduce conflicts when intra-group inequality is important, we can think of the following stylised scenario. Initially (almost) all capital and land assets are concentrated in the hands of a given player m of group 1. All other players in group 1 and all players in group 2 have only an infinitely small endowment of capital or land,K_{ε}[11].

As in the aggregate case, the individual reaction functions of a player i in group 1 facing a player j from group 2 is as displayed below (this is analogous for players in group 2).

$$L_{1i} = \left[\frac{\alpha_i a_i}{\beta_j^{\rho_i}}\right]^{\frac{1}{1-a_i}} K_{\varepsilon}^{\frac{b_i - d_j\rho_i}{1-a_i}} L_{2j}^{\frac{1-c_j\rho_i}{1-a_i}} \qquad (12)$$

It is assumed that the factor intensities for players from the two groups are similar. Thus, $b_i - d_j\rho_i > 0$. It follows that, for an infinitely small capital and land endowment K_{ε}, we have $\lim \left[\frac{\alpha_i a_i}{\beta_j^{\rho_i}}\right]^{\frac{1}{1-a_i}} K_{\varepsilon}^{\frac{b_i - d_j\rho_i}{1-a_i}} = 0$. Thus, whenever

[10] The results derived in this subsection would also hold allowing for different sizes of the two population groups.

[11] People always have a non-zero level of capital. However, in very unequal societies this capital endowment can be almost zero, for example if people only possess the clothes they are wearing.

landless and capital lacking players match, their reaction functions only intersect once, at the "bad" equilibrium (0,0). Only in the match involving the big landowner m might the reaction functions intersect more than once and the "good" equilibrium occur. For a large population the proportion of matches where peace is feasible would become negligibly small.

We shall now consider the case where redistribution of land and capital takes place. The huge endowment is equally distributed among all players who now receive a capital level of $K_A > 0$ each. The reaction function of a given player i from group 1 becomes as follows (it is the same for players from group 2).

$$L_{1i} = \left[\frac{\alpha_i a_i}{\beta_j^{\rho_i}}\right]^{\frac{1}{1-a_i}} K_A^{\frac{b_i - d_j\rho_i}{1-a_i}} L_{2j}^{\frac{1-c_j\rho_i}{1-a_i}} \tag{13}$$

Provided that $\left[\frac{\alpha_i a_i}{\beta_j^{\rho_i}}\right]^{\frac{1}{1-a_i}} K_A^{\frac{b_i - d_j\rho_i}{1-a_i}} \geq 1$, both equilibria (0,0) and (1,1) are now possible. It is reasonable to think that in some of the matches the "good" equilibrium (1,1) is selected, especially if $\left[\frac{\alpha_i a_i}{\beta_j^{\rho_i}}\right]^{\frac{1}{1-a_i}} K_A^{\frac{b_i - d_j\rho_i}{1-a_i}}$ is large, which leads to a big basin of attraction of the "good" equilibrium (1,1). As before, the expression $\left[\frac{\alpha_i a_i}{\beta_j^{\rho_i}}\right]^{\frac{1}{1-a_i}} K_A^{\frac{b_i - d_j\rho_i}{1-a_i}}$ is increasing in K_A as long as $b_i - d_j\rho_i > 0$ holds. In a nutshell, the aggregate fighting effort in the society has in this case been reduced by a more egalitarian redistribution of land.

Thus for a situation where intra-group inequalities in capital and land distribution are important, the conclusions reached by the model are in line with those of Grossman (1994). The findings of this subsection are summarised in the following proposition:

Proposition 2 *Capital redistribution is not an efficient measure to reduce conflict, if most of the land and capital inequality is between groups and when all capital is employed in production. When a part of the capital is consumed rather than invested, or when most inequality is within groups, redistribution can lead to less appropriation.*

Proof. Follows from the discussion above. ■

3.3 Education, Public Health Promoting and Poverty Alleviation Programmes

In this part is examined what happens if taxation revenue is not simply transferred, but spent on education, health and poverty-alleviation programmes, which would eventually lead to a higher total factor productivity. Thus, we have the following payoff function for group 1 (for group 2 it is analogous):

$$V_1 = L_2(1-t)y_1 + (1-L_1)\left[(1-t)y_2\right]^{\rho} \tag{14}$$

Introducing the production function in (14), we obtain:

$$V_1 = L_2(1-t)\alpha(t)L_1^a K_1^b + (1-L_1)(1-t)^\rho(\beta(t))^\rho L_2^{c\rho} K_2^{d\rho} \tag{15}$$

Please note that now α and β are assumed to be strictly increasing concave functions of t, i.e. $\alpha = \alpha(t)$ and $\beta = \beta(t)$.

We obtain reaction function (16) for group 1 (it is similar for group 2):

$$L_1 = (\alpha(t))^{\frac{1}{1-a}}(\beta(t))^{\frac{-\rho}{1-a}} a^{\frac{1}{1-a}} K_1^{\frac{b}{1-a}} K_2^{\frac{-d\rho}{1-a}} L_2^{\frac{1-c\rho}{1-a}} (1-t)^{\frac{1-\rho}{1-a}} \tag{16}$$

The partial derivative of L_1 with respect to t is positive under the condition that $\frac{1}{\alpha}\frac{\partial\alpha}{\partial t} - \frac{\rho}{\beta}\frac{\partial\beta}{\partial t} > \frac{1-\rho}{1-t}$.

This means that education, health and anti-poverty spending are likely to increase the labour time of a given group if it has a low initial level of total factor productivity and if the policy measures much increase its productivity. By contrast, the increase in the total factor productivity of the opponent tends to decrease the first group's incentives to pursue productive activities. This is intuitive, as an increase in the productivity of the opponent makes the opponent a more attractive target. However, for most parameter values it is likely that these three policies lead to less conflict overall, as the conflict-reducing term $\frac{1}{\alpha}\frac{\partial\alpha}{\partial t}$ is multiplied by 1, whereas the conflict-enhancing term $\frac{1}{\beta}\frac{\partial\beta}{\partial t}$ is multiplied by $\rho < 1$.

This reasoning becomes more apparent, if we focus on the symmetrical case, where $\alpha = \beta$. In this case, the condition for education, health and anti-poverty spending to reduce conflict becomes: $\frac{\partial\alpha}{\partial t} > \frac{\alpha(t)}{(1-t)}$.

It follows from our assumptions that taxation will have a positive impact on the total factor productivity α, thus $\frac{\partial\alpha}{\partial t} \geq 0$. Our concavity assumption implies that the marginal productivity of taxation spending is strictly decreasing. Thus, $\frac{\partial^2\alpha}{(\partial t)^2} < 0$.

For low levels of α and t the derivative $\frac{\partial\alpha}{\partial t}$ is big. Thus, for low values of α and of t it is likely that condition $\frac{\partial\alpha}{\partial t} > \frac{\alpha(t)}{(1-t)}$ holds. The policy implications for reducing conflict, i.e. to increase spending on education, health and poverty-alleviation programmes if total factor productivity is low, appear reasonable. Proposition 3 summarises our reasoning.

Proposition 3 *When the total factor productivity is a strictly increasing concave function of education, health and poverty-alleviation spending, marginally increasing the public expenditures for these policies increases the overall time spent on productive activities if the country is "stuck" in a low productivity- and low taxation- equilibrium.*

Proof. Follows from the discussion above. ■

Increases in education, health and anti-poverty spending benefit above all the "low productivity" group. This is the case because the marginal productivity of those policies is decreasing. The "low productivity" group is in general the most

likely to choose a high level of appropriative activities. Therefore, education, health promotion and poverty-alleviation programmes are well-focused.

Furthermore, independently of the impact of an increase in the total factor productivity on the labour supply of the two groups, such an increase in the total factor productivity could result in a higher output y_i. In fact, there will be a trade-off between the costs of these kinds of public expenditures and their returns. However, this issue is already well-documented in the literature and is not directly linked to our main focus.

4 Conflict Analysis in a Two-period Framework and the Impact of Education and Equality of Opportunity

In this section the basic model will be extended to a two-period framework. The idea is that education spending at an early stage and the offering of perspectives for a bright future can prevent the disadvantaged from investing in fighting capital. For simplicity, the model does not take intra-household bargaining into account.

In the first period the group lives in a poor rural setting. Modest surplus from agricultural activity can be invested in either productive capital (in particular production skills and human capital) or in fighting capital. To put it differently, the group only needs to spend a proportion s of its time for assuring its subsistence expenditures and has some spare time (1-s) (the surplus) which can be used for acquiring productive or fighting skills. The choice in period one will influence the total factor productivity and the fighting technology in period two. Equation (17) displays the choice of group 1 in the first period (it is similar for group 2). The time endowment is normalised to 1.

$$(1 - s) = E + W \tag{17}$$

where s = part of time endowment in the first period used for subsistence, E = accumulation of productive (human) capital, W = accumulation of fighting capital.

This equation can be reformulated and be expressed in terms of E respectively W.

$$E = \left[\frac{E}{E + W}\right](1 - s) \equiv e(1 - s) \tag{18}$$

$$W = \left[\frac{W}{E + W}\right](1 - s) \equiv w(1 - s) \tag{19}$$

where e = proportion of surplus that is used for the accumulation of productive capital, w = proportion of surplus that is used for the accumulation of fighting capital.

The accumulation of productive capital in period one increases the total factor productivity in period two: $\alpha = \alpha(\overset{+}{E})$. Similarly, accumulating fighting capital in the first period improves the fighting technology in the second period. In particular, it reduces the friction from appropriation. We have: $\rho = \rho(\overset{+}{W})$.

The framework in period two is identical to the one used in the one-period model of the previous section. Thus, in period two we have the same reaction function for group 1 as before in equation (3), with the difference that α and ρ are now endogenous. The new reaction function is displayed in equation (20).

$$L_1 = \left(\frac{\alpha(\overset{+}{E_1})a}{\beta(\overset{+}{E_2})^{\rho(\overset{+}{W}_1)}} \right)^{\frac{1}{1-a}} K_1^{\frac{b}{1-a}} K_2^{\frac{-\rho(\overset{+}{W_1})d}{1-a}} L_2^{\frac{1-c\rho(\overset{+}{W_1})}{1-a}} \tag{20}$$

Group 1's production time in period two is increased by its own accumulation of productive capital in period one (E_1), and is negatively affected by the accumulation of skills of its opponent (E_2), as α is in the nominator and β enters the denominator. The intuitive reason is that increases in its own total factor productivity increase the incentives to work, whereas a higher total factor productivity of the opponent increases the incentives to steal from the opponent. However, as α is in the power of $\frac{1}{1-a}$, and β is in the power of $\frac{\rho}{1-a} < \frac{1}{1-a}$, on the whole the positive impact of skills accumulation of both groups outweighs its negative impact. For a symmetrical case both groups will end up fighting less. In addition, the accumulation of human capital will as well lead to a higher economic output.

As shown in equation (21), the first derivative of the production time in period two with respect to the fighting technology parameter is negative. Thus, the greater the term ρ (which corresponds to a lower friction of appropriation), the more time will be spent for appropriation in the second period. Accordingly, W, the accumulation of fighting technology in period one, increases the intensity of conflict in period two.

$$\frac{\partial L_1}{\partial \rho} = -(\frac{1}{1-a}) \left[\alpha a \beta^{-\rho} K_1^b K_2^{-d\rho} L_2^{1-c\rho} \right]^{\frac{1}{1-a}} (\ln \beta + c \ln L_2 + d \ln K_2) \tag{21}$$

It follows that the level of conflict is lower the higher E is and the lower W is. Thus, a policy would be desirable if it increases the proportion of the surplus in the first period used for human capital accumulation and accordingly reduces the fighting capital accumulation. Education and the offering of a perspective for a better future could fulfil this role. If children spend more time in school, they acquire production skills which give them incentives later on to spend their time producing rather than appropriating. Further, the time they spend in school cannot be used for acquiring fighting capital. Lack of real chances in life and of a meritocratic society gives incentives to children to accumulate fighting/appropriation capital in their youth (period 1). Later on they have incentives to use the fighting skills for appropriation.

A possible policy approach is to tax an amount r of the surplus in period one and to use it for education spending. It would also be conceivable to administrate a direct or indirect benefit scheme for families who put their children in school. Taxing the amount r would leave a disposable income of $(1-s)-r$. The new values of E and W are displayed in the equations (22) and (23).

$$E' = e\left[(1-s)-r\right]+r = E+(1-e)r > E \tag{22}$$

$$W' = w\left[(1-s)-r\right] = W - wr < W \tag{23}$$

Thus, also in a two-period framework education spending reduces the risk of conflict.

5 Empirical Evidence

It is important to test in an empirical section whether our theoretical findings are reasonable. In the literature there have been several influential empirical studies of civil wars (see Fearon and Laitin, 2003; Collier and Hoeffler, 2004; Miguel, Satyanath and Sergenti, 2004). These studies have focused on socioeconomic explanatory factors of civil conflicts such as economic growth, wealth, ethnicity, natural resources, and population. There has been little empirical evidence about the impact of welfare state policies on the likelihood of civil war outbreaks. By testing our theoretical model I would like to address this shortcoming.

For making the most convincing and "strongest" possible test of the impact of welfare state policies on civil conflict onsets, I will apply the same data, method and core specification as used in Fearon and Laitin (2003), one of the most influential papers in the field. I will update the data for a further five years (2000-2004) and include welfare state variables. Also, I will include many additional robustness tests not performed in Fearon and Laitin (2003), using alternative methods, independent or dependent variables.

5.1 The Data and Method

Panel data for 155 countries from 1965 to 2004 will be used to explain the likelihood of the outbreak of a civil war. All countries that had a population of at least half a million in 1990 were included. The start date of 1965 has been chosen for the reason that, for several of the variables included, there is no data before 1965. All variables are described in the Appendix.

As is done in Fearon and Laitin (2003), and in almost all other papers in the field, I will explain the outbreak of wars rather than the number of periods of fighting. As dependent variable, civil war onset data from Fearon and Laitin (2003) has been used. It has been updated for the years 2000 to 2004 using the "Data on Armed Conflicts" database of PRIO (2006, in collaboration with the University of Uppsala). All internal conflicts that cause more than 1000 battle related deaths for the whole conflict are coded as civil wars. This is a dummy

variable which takes the value of 1 for an outbreak of war, and 0 if no outbreak of a new war occurs. Other independent variables are included in the robustness checks and discussed at a later stage as well as in the Appendix.

The main explanatory and control variables are taken from various sources. The first welfare state variable included corresponds to "general government consumption expenditure" in percent of GDP (World Bank, 2006b). This captures the size of the state in terms of the size of the economy. The data is available for most countries and years between 1965 and 2004.

It would be more appealing to use a variable such as "social spending" or "extent of redistribution", rather than general government expenditure. However, the data on general government expenditure has the important advantage of being available for most countries and years and allows for minimising the number of missing observations, while the data on social spending from sources like the government statistics of the IMF is only available for few countries and years.

It seems very much defendable to include general government spending in percent of GDP as a proxy for redistribution, given that typically the states with most redistribution (for example, the Scandinavian countries) also have the highest overall level of state expenditure. The Pearson correlation between the data on general government spending and the data on social spending that is only available for OECD countries (cf. OECD, 2007) is as high as 0.79. This could indicate that most of the inter-country variation in general government expenses is due to differences in social transfers, while other forms of government spending, for example for infrastructure, might vary less. Thus, it seems that our "general government spending" variable measures exactly what we would like it to measure.

The other welfare state variable used as an explanatory variable in this section refers to the level of education spending as a percentage of GDP (World Bank, 2006a). Data for this variable is available from 1970 to 2004, although not all years are covered.

As shown later, other potential welfare state indicators such as health spending (World Bank, 2006b), which is only available for certain countries and years between 1990 and 2004, cannot be included in the regression analysis due to a lack of observations.

The control variables are the same as the ones included in Fearon and Laitin (2003), but are updated for the years 2000 to 2004 using the same method as applied by these authors. Also further variables are included in the robustness checks. These variables are from various sources and are explained in detail in the Appendix.

In the empirical study of civil wars several methodological issues arise. Having a limited dependent variable I will, like Fearon and Laitin (2003), Collier and Hoeffler (2004), and the vast majority of papers in the field, perform logit regressions. Other estimators are included in the robustness checks.

An important issue is the direction of causality between outbreaks of civil wars on one hand and economic output and welfare state policies on the other hand. A negative correlation between these variables could be due to welfare

	Sample	No civil war	Civil war
Goverment spending (in % of GDP), first lag	15.484	15.523	12.82
	(n=4597)	(n=4532)	(n=65)
Education spending (in % of GDP), first lag	4.349	4.36	3.358
	(n=2462)	(n=2433)	(n=29)
Health spending (in % of GDP), first lag	5.905	5.914	4.26
	(n=922)	(n=917)	(n=5)

Table 1: Descriptive statistics

spending and economic performance decreasing the risk of civil wars or due to the depressing effect of war on the economy and on public spending. Miguel, Satyanath and Sergenti (2004) have solved this endogeneity problem with the help of instrumental variables (rainfall) for economic shocks. Fearon and Laitin (2003) and Collier and Hoeffler (2004) have addressed endogeneity concerns using lags. For assuring comparability, I will include like Fearon and Laitin (2003) lags in the core specifications. However, I will perform two-stage estimations with instruments as robustness checks.

5.2 The Results

Descriptive statistics are useful for gaining an overall view. In table 1 the different means of government spending and education spending in percent of GDP are displayed for the whole sample included in the dataset, as well as split between the country years that experience an outbreak of civil war and the others.

The country years where civil wars broke out are associated with a lower level of government spending (significant at a 1% level), a lower proportion of education spending (significant at a 1% level), and less health spending (significant at a 5% level).

When government spending is included in the analysis, most of the civil wars occurring are in the sample (n=65). It looks more worrying for education spending, where only 29 civil wars are included in the sample, and for health spending, where the number of wars drops to 5. According to what control variables are included, these values slightly decrease due to the missing observations in the control variables.

Given that there are so many missing observations for the health variable, it will not be included in the regression analysis. The education variable will first be included without specific treatment of missing values (i.e. the standard method of listwise deletion is used). Later on, the regressions for the education variable will be re-run with missing observations being imputed using "best subset" regressions.

Regressions are now performed in order to estimate the impact of government spending and education spending on the likelihood of civil war outbreaks.

Table 2 displays the main results and some robustness checks for the government spending variable, while in table 3 further robustness checks for this same variable are performed.

In column (1) of table 2 the core regression is shown. As predicted by the theoretical model, lagged government expenditures reduce the likelihood of civil war outbreaks at a level of confidence of 95%. All control variables have the same sign as in Fearon and Laitin's (2003) study, with the exception of the democracy variable (which is insignificant in both studies). Also, besides the variable of previous wars, all variables that they found to be statistically significant are as well significant in the present study. Richer countries experience less conflict, while in more populated, mountainous, oil-rich, recent and instable states civil wars are more likely.

The marginal effects suggest that government spending has a large impact on the conflict risk. A country year with all average characteristics and with the average level of government spending of 15,5 % of GDP has a risk of 0.64 % of experiencing a civil war. By contrast, when a country year with otherwise identical characteristics has only a government spending level of 5 % the conflict risk more than doubles to 1.35 %, while for government spending of 30 % of GDP the risk of civil wars drops to only 0.23 %.

In column (2) a further important control variable, the lagged growth rate, that was omitted in Fearon and Laitin (2003), is included. As found in Miguel, Satyanath and Sergenti (2004) and Collier and Hoeffler (2004), growth has a negative sign and is statistically significant. The conflict-reducing impact of government spending remains significant at a 5 % level. I have tested the model with various other control variables, and the negative effect of government expenditures on conflict always remained statistically significant.

The results are robust to the inclusion of time dummies[12] in column (3) and country fixed effects and time dummies in column (4). The columns (5) and (6) are devoted to endogeneity checks. In column (5) the average of government spending in the last three years is taken as the main explanatory variable. It still remains significant at 5 %. In column (6) a two-stage probit estimation is performed. Three variables that are correlated with government spending are taken as instruments: debt service, part of the country that is rural, and the proportion of people over 65 years old. These variables have not been found to have an impact on the conflict risk in previous studies and enter insignificantly in the (one stage) regression. Also for this two-stage probit estimation, the government spending has a war-reducing effect at a confidence level of 90 %. The results are robust to the use of several other instruments that I have tried.

In table 3 further robustness checks are displayed and the effect of government spending on other related dependent variables is assessed. In column (1) the core model is reestimated with a rare event logit (ReLogit) estimator, using the method of King and Zeng (2001). Again, government spending reduces conflict at a confidence level of 95 %. In column (2) a probit estimator is used.

[12] As in some particular years no conflict onsets occur, I have taken 5-year periods for the time dummies.

	(1) Core Regression	(2) Growth Variable	(3) Time Effects	(4) Time and Fixed Eff.	(5) Last 3 Years	(6) Two-stage Probit
Govern. Spending (-1)	*-0.072*	*-0.078*	*-0.078*	*-0.120*	*-0.084*	*-0.221*
	*(2.22)***	*(2.41)***	*(2.34)***	*(1.95)**	*(2.28)***	*(1.66)**
Prior Wars	-0.112	-0.172	-0.079	-4.117	-0.186	-0.203
	(0.33)	(0.51)	(0.23)	(5.61)***	(0.53)	(0.92)
GDP per capita (-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(2.21)**	(2.18)**	(2.29)**	(0.01)	(2.21)**	(1.22)
ln Population (-1)	0.225	0.242	0.216	7.404	0.219	-0.19
	(2.24)**	(2.31)**	(2.12)**	(2.63)***	(2.12)**	(1.06)
Mount. Territory	0.015	0.014	0.015		0.018	0.002
	(2.43)**	(2.30)**	(2.46)**		(2.88)***	(0.69)
Non-contig.	0.541	0.648	0.490		0.588	0.581
	(1.38)	(1.63)	(1.22)		(1.43)	(1.75)*
Oil Exporter	0.664	0.618	0.765	1.861	0.599	0.423
	(1.83)*	(1.71)*	(2.07)**	(1.61)	(1.55)	(1.88)*
New State	3.410	3.117	3.019	1.432	2.625	2.156
	(5.85)***	(5.12)***	(4.90)***	(0.49)	(3.17)***	(3.10)***
Instab. (-1)	0.723	0.676	0.730	0.865	0.581	-0.070
	(1.81)*	(1.69)*	(1.81)*	(1.65)*	(1.37)	(0.26)
Democracy (-1)	-0.002	-0.007	0.019	0.116	0.013	-0.025
	(0.05)	(0.15)	(0.42)	(1.49)	(0.30)	(0.97)
Ethnic Fractional.	0.558	0.499	0.563		0.475	0.122
	(1.04)	(0.93)	(1.04)		(0.87)	(0.47)
Religious Fractional.	0.835	0.781	1.011		1.057	0.201
	(1.12)	(1.05)	(1.33)		(1.35)	(0.58)
GDP Growth (-1)		-0.050				
		(2.53)**				
Time Dummies			Yes	Yes		
Constant	-7.871	-7.910	-8.876		-7.709	4.016
	(4.38)***	(4.27)***	(4.57)***		(4.12)***	(0.82)
Observations	4374	4270	4374	1336	4121	2925
Pseudo R2	0.13	0.14	0.15	0.26	0.12	0.082
Log Likelihood	-260.25	-256.02	-254.73	-133.29	-242.39	-224.92

Note: Logit regressions, unless reported otherwise. Dependent variable: War start, unless reported otherwise. Abs. value of z statistics in parentheses. *, **, *** = significant at 10%, 5%, 1% respectively. (-1) = first lag.

Table 2: Main results and endogeneity checks for government spending

	(1)	(2)	(3)	(4)	(5)	(6)
	ReLogit	Probit	Coups	Guerrilla	Assassin.	Strikes
Govern. Spending (-1)	*-0.068*	*-0.029*	*-0.043*	*-0.002*	*-0.006*	*-0.002*
	*(2.18)***	*(2.18)***	*(2.26)***	*(1.03)*	*(2.32)***	*(1.50)*
Prior Wars	-0.097	-0.034				
	(0.27)	(0.26)				
GDP per capita (-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(1.63)	(2.21)**	(2.91)***	(4.71)***	(3.70)***	(2.80)***
ln Population (-1)	0.225	0.096	-0.167	0.045	0.057	0.046
	(2.60)***	(2.24)**	(2.08)**	(6.61)***	(4.64)***	(6.79)***
Mount. Territory	0.015	0.006	0.004	0.001	0.004	0.000
	(2.46)**	(2.36)**	(1.00)	(2.78)***	(5.20)***	(0.71)
Non-contig.	0.555	0.214	-0.195	0.229	0.157	0.028
	(1.47)	(1.29)	(0.46)	(8.52)***	(3.21)***	(1.05)
Oil Exporter	0.665	0.252	-0.371	-0.039	0.062	-0.006
	(2.03)**	(1.63)	(1.10)	(1.48)	(1.30)	(0.22)
New State	3.403	1.527	1.003	-0.106	-0.036	-0.072
	(6.24)***	(5.10)***	(1.32)	(0.97)	(0.18)	(0.67)
Instab. (-1)	0.766	0.296	0.282	0.043	0.220	0.089
	(1.90)*	(1.72)*	(0.89)	(1.16)	(3.27)***	(2.41)**
Democracy (-1)	-0.003	-0.001	-0.071	-0.002	0.018	0.018
	(0.08)	(0.04)	(2.13)**	(0.80)	(3.92)***	(6.98)***
Ethnic Fractional.	0.540	0.277	0.901	0.111	0.016	0.081
	(1.00)	(1.26)	(2.19)**	(3.00)***	(0.23)	(2.19)**
Religious Fractional.	0.863	0.359	-0.921	-0.218	-0.451	-0.411
	(1.12)	(1.20)	(1.83)*	(4.76)***	(5.43)***	(9.06)***
Constant	-7.862	-3.772	0.188	-0.498	-0.564	-0.486
	(4.73)***	(5.03)***	(0.13)	(4.22)***	(2.64)***	(4.15)***
Observations	4374	4374	4223	4225	4225	4225
(Pseudo) R2	0.13	0.13	0.09	0.06	0.05	0.06
Log Likelihood	-260.25	-260.48	-469.32			

Note: Logit regressions, unless reported otherwise. Dependent variable: War start, unless reported otherwise. Abs. value of z statistics in parentheses. *, **, *** = significant at 10%, 5%, 1% respectively. (-1) = first lag.

Table 3: Robustness checks and other dependent variables for government spending

Government expenditure remains significant at 5 %.

In what follows it is assessed whether government spending also has an influence on other potential dependent variables related to political violence, such as coups, guerrilla warfare, political assassinations and general strikes. These variables are taken from Banks (2005) and are described in detail in the Appendix. Different forms of political violence have different main explanatory factors. For coups, for example, the structure and organisation of the military matters (cf. Collier and Hoeffler, 2006), while for guerrilla movements the geographic characteristics of a country and the distribution of ethnic groups is important. However, all these phenomena have in common that they are associated with politically motivated violence, and that they could at least partially be caused by grievances due to deprivation and low levels of redistribution. Thus, although it is not for the sake of a robustness check, we will analyse if government spending also has an impact on those related forms of political violence and civil unrest. For guaranteeing an optimal comparability of the results, the control variables of Fearon and Laitin (2003) will be included as before. These control variables are likely to capture most of the relevant explanatory factors, although obviously the explanatory power of each individual variable is expected to vary according to which dependent variable is used.

Government spending also reduces the occurrence of (successful) coups d'états (column (3), logit regression) and political assassinations (column (5), OLS) at a 5 % level. In the regressions for guerrilla warfare (column (4), OLS) and for general strikes (column (6), OLS), government spending has the correct sign, but is not statistically significant.

The next three tables are devoted to the variable of education spending in percent of GDP. As we have seen before, there is much more missing data for this variable than was the case for the government spending variable. The number of observations is almost halved.

In column (1) of table 4 the core model with education is displayed. The lagged education variable has the right sign, but is not significant. In column (2) the lagged education variable is interacted with lagged GDP. As predicted by the model, the interaction term is positive (total factor productivity enhancing policies work best when the initial productivity is low). However, it is not significant. Also the non-interacted education variable remains insignificant. Furthermore, the same robustness checks as before (Time effects, Fixed effects, ReLogit estimation, Probit estimation) have been performed for the education variable and in all these cases the sign is correct but the variable is not significant. For keeping the present paper to an appropriate length, these results are not displayed.

In column (3) a two-stage probit estimation is performed, using the same instruments as for the government spending variable previously. Now the education variable turns significant at a 10% level. In columns (4) to (7) it is shown that education reduces the risk of coups, of guerrilla warfare, of political assassinations and of general strikes significantly at a 5%, respectively 1% level.

As discussed earlier, the number of wars in the sample drops strongly when the education variable is included. As shown in table 1, data for education

	(1) Core Regression	(2) Interaction Term	(3) Two-stage Probit	(4) Coups	(5) Guerrilla	(6) Assassin.	(7) Strikes
Educ. Spending (-1)	*-0.063*	*-0.163*	*-0.828*	*-0.259*	*-0.020*	*-0.043*	*-0.033*
	(0.46)	*(0.88)*	*(1.76)**	*(2.39)***	*(4.26)****	*(3.48)****	*(4.67)****
*Interaction Educ.*GDP*		*0.000*					
		(0.87)					
Prior Wars	0.187	0.195	-0.477				
	(0.32)	(0.33)	(1.11)				
GDP per capita (-1)	-0.001	-0.001	-0.000	-0.000	-0.000	-0.000	-0.000
	(2.82)***	(1.88)*	(1.52)	(1.84)*	(6.40)***	(4.90)***	(2.68)***
ln Population (-1)	0.334	0.328	-0.093	-0.093	0.039	0.043	0.036
	(2.39)**	(2.34)**	(0.65)	(0.75)	(6.43)***	(2.73)***	(3.95)***
Mount. Territory	0.021	0.023	0.007	0.008	0.002	0.005	0.001
	(2.29)**	(2.43)**	(1.60)	(1.20)	(4.25)***	(4.63)***	(0.90)
Non-contig.	0.732	0.810	0.459	-0.680	0.198	0.254	-0.003
	(1.16)	(1.26)	(1.23)	(0.88)	(8.40)***	(4.13)***	(0.09)
Oil Exporter	0.845	0.874	0.616	-0.111	0.019	0.171	0.019
	(1.38)	(1.41)	(2.04)**	(0.22)	(0.81)	(2.87)***	(0.55)
New State	4.241	4.250	3.208	1.471	-0.075	-0.077	-0.067
	(4.84)***	(4.88)***	(3.15)***	(1.37)	(0.91)	(0.36)	(0.53)
Instab. (-1)	1.024	1.072	-0.184	0.575	-0.087	-0.049	0.084
	(1.70)*	(1.76)*	(0.47)	(1.22)	(2.58)***	(0.55)	(1.62)
Democracy (-1)	0.119	0.125	0.036	-0.028	0.009	0.027	0.025
	(1.59)	(1.65)*	(1.03)	(0.53)	(3.75)***	(4.54)***	(7.13)***
Ethnic Fractional.	-1.845	-1.889	-0.028	0.580	0.189	-0.020	0.095
	(2.38)**	(2.45)**	(0.07)	(0.86)	(5.56)***	(0.23)	(1.83)*
Religious Fractional.	0.604	0.516	-0.650	-0.349	-0.157	-0.493	-0.395
	(0.49)	(0.42)	(1.08)	(0.40)	(3.86)***	(4.65)***	(6.37)***
Constant	-9.695	-9.271	2.550	-1.233	-0.478	-0.268	-0.261
	(3.77)***	(3.51)***	(0.62)	(0.57)	(4.65)***	(1.00)	(1.66)*
Observations	2333	2333	1628	2232	2247	2247	2247
(Pseudo) R2	0.24	0.24	0.17	0.11	0.15	0.07	0.07
Log Likelihood	-105.51	-105.23	-89.00	-179.32			

Note: Logit regressions, unless reported otherwise. Dependent variable: War start, unless reported otherwise. Absolute value of z statistics in parentheses. *, **, *** = significant at 10%, 5%, 1% respectively. (-1) = first lag.

Table 4: Main results, robustness checks, and other dependent variables for education spending

spending is only available for 29 country years that experienced civil war outbreaks, while data on government spending is available for 65 such country years. This reduction in the sample size could be one of the reasons why the impact of education on conflict treated in table 4 was not statistically significant, while education was strongly significant for the other dependent variables related to civil unrest. These variables do not suffer to the same extent from the problem of missing observations, as they contain more onsets of civil unrest.

For countering this problem of data availability, the missing values are imputed for tables 5 and 6. The technique of (single) imputation using regression "best subset" estimations has been used[13]. With this technique, missing values are estimated with the help of a regression that includes all other independent variables as well as further variables and accounts for a degree of random error. (Single) regression imputation can be used as long as missing observations are either missing completely at random (MCAR) or missing at random (MAR). This is the case for our data[14]. (Single) regression imputation and multiple imputation have been shown in the literature (Deville and Särndal, 1994; King *et al.*, 2001; Little and Rubin, 2002; Acock, 2005) to be much more effective than other traditional techniques such as mean imputation, conditional mean imputation or missing data indicators[15].

The first column of table 5 is devoted to the core regression with the imputed education data. Education now has a conflict reducing impact that is significant at a 10% level. When the growth variable is added in column (2), education even becomes significant at 5%. In column (3) the interaction term between education and GDP is included. Education still has a negative sign and is significant at a 10% level, while the interaction term has the expected sign, but is not significant. The significant conflict reducing impact of education is robust to the inclusion of time effects in column (4), country fixed effects and time effects in column (5), three years of lags in column (6) and for performing a two-stage probit estimation in column (7).

In table 6 further robustness tests for the results with the imputed education variable are performed. Also, other dependent variables are included. As

[13] The imputation was performed in Stata 9 using the "impute" command. The dependent and all independent variables of the core model (column (1) in table 2), as well as other variables that are correlated with education (the lags 1 to 6 of education, the total life expectancy at birth, the number of hospital beds per 1000 people, the crude birthrate per 1000 people) were included for the estimation of the missing values of the education variable. These three additional variables are all from the World Bank (2006b).

[14] Typically, single and multiple imputation are only problematic when data is not missing at random (NMAR), which is mostly the case for survey and opinion polls data.

[15] From a theoretical point of view, multiple (regression) imputation (which creates a series of different datasets) is even more powerful than single (regression) imputation, as it accounts not only for sampling variation, but as well for imputation variation. In empirical studies both techniques have been found to perform in similarly effective ways (Ezzati-Rice *et al.*, 1993; Acock, 2005). In the present analysis multiple imputation has the disadvantage of being more difficult to apply for the robustness checks, where not only logit estimators are used. However, I have re-run the estimations of the paper using the multiple imputation procedure Amelia (King *et al.*, 2001) and other methods such as mean imputation, conditional mean imputation etc and have found similar results as with single imputation.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Core Regression	Growth Variable	Interaction Term	Time Effects	Time and Fixed Eff.	Last 3 Years	Two-stage Probit
Educ. Spending (-1)	*-0.187*	*-0.208*	*-0.214*	*-0.182*	*-0.448*	*-0.196*	*-0.462*
	*(1.75)**	*(1.98)***	*(1.81)**	*(1.70)**	*(2.26)***	*(1.76)**	*(1.73)**
*Interaction Educ.*GDP*			*0.000*				
			(0.10)				
Prior Wars	-0.222	-0.280	-0.279	-0.180	-4.290	-0.227	-0.296
	(0.66)	(0.83)	(0.83)	(0.53)	(5.86)***	(0.67)	(1.24)
GDP per capita (-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(2.36)**	(2.33)**	(0.88)	(2.46)**	(0.13)	(2.34)**	(1.72)*
ln Population (-1)	0.207	0.220	0.219	0.200	8.236	0.203	-0.009
	(2.13)**	(2.19)**	(2.17)**	(2.03)**	(2.84)***	(2.08)**	(0.11)
Mount. Territory	0.014	0.013	0.013	0.014		0.014	0.006
	(2.33)**	(2.26)**	(2.27)**	(2.33)**		(2.35)**	(2.32)**
Non-contig.	0.546	0.651	0.654	0.498		0.550	0.352
	(1.40)	(1.64)	(1.64)	(1.24)		(1.40)	(1.52)
Oil Exporter	0.444	0.387	0.388	0.528	2.209	0.445	0.319
	(1.24)	(1.09)	(1.09)	(1.45)	(1.91)*	(1.25)	(1.69)*
New State	3.205	2.867	2.868	2.763	1.527	3.146	1.986
	(5.59)***	(4.81)***	(4.81)***	(4.56)***	(0.86)	(5.56)***	(3.45)***
Instab. (-1)	0.659	0.614	0.615	0.655	0.729	0.673	-0.023
	(1.65)*	(1.54)	(1.54)	(1.62)	(1.42)	(1.69)*	(0.10)
Democracy (-1)	-0.002	-0.006	-0.006	0.018	0.121	-0.004	0.016
	(0.05)	(0.13)	(0.13)	(0.41)	(1.56)	(0.09)	(0.70)
Ethnic Fractional.	0.606	0.553	0.549	0.600		0.611	-0.072
	(1.13)	(1.03)	(1.01)	(1.11)		(1.14)	(0.29)
Religious Fractional.	0.388	0.355	0.345	0.496		0.377	0.080
	(0.54)	(0.49)	(0.48)	(0.69)		(0.53)	(0.23)
GDP Growth (-1)		-0.051	-0.051				
		(2.53)**	(2.53)**				
Time Dummies				Yes	Yes		
Constant	-7.532	-7.539	-7.493	-8.649		-7.433	-0.326
	(4.29)***	(4.20)***	(4.05)***	(4.57)***		(4.18)***	(0.14)
Observations	4537	4418	4418	4537	1391	4537	3012
Pseudo R2	0.12	0.13	0.13	0.13	0.27	0.12	0.08
Log Likelihood	-274.37	-269.99	-269.99	-268.73	-137.46	-274.36	-230.92

Note: Logit regressions, unless reported otherwise. Dependent variable: War start, unless reported otherwise. Absolute value of z statistics in parentheses. *, **, *** = significant at 10%, 5%, 1% respectively. (-1) = first lag.

Table 5: Main results and robustness checks with the imputed education spending variable

	(1)	(2)	(3)	(4)	(5)	(6)
	ReLogit	Probit	Coups	Guerrilla	Assassin.	Strikes
Educ. Spending (-1)	*-0.176*	*-0.086*	*-0.171*	*-0.022*	*-0.051*	*-0.032*
	*(1.84)**	*(1.95)**	*(2.54)***	*(3.80)****	*(4.97)****	*(5.56)****
Prior Wars	-0.206	-0.086				
	(0.59)	(0.65)				
GDP per capita (-1)	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(1.80)*	(2.32)**	(2.99)***	(4.20)***	(3.40)***	(2.15)**
ln Population (-1)	0.207	0.086	-0.144	0.041	0.052	0.043
	(2.46)**	(2.10)**	(1.93)*	(6.20)***	(4.48)***	(6.74)***
Mount. Territory	0.014	0.006	0.004	0.001	0.004	0.000
	(2.37)**	(2.27)**	(1.03)	(2.68)***	(5.39)***	(0.72)
Non-contig.	0.562	0.213	-0.312	0.234	0.144	0.019
	(1.48)	(1.29)	(0.74)	(8.85)***	(3.06)***	(0.73)
Oil Exporter	0.450	0.173	-0.448	-0.035	0.060	-0.004
	(1.34)	(1.15)	(1.33)	(1.37)	(1.31)	(0.14)
New State	3.206	1.453	1.109	-0.089	-0.009	-0.014
	(5.70)***	(5.00)***	(1.47)	(0.84)	(0.05)	(0.13)
Instab. (-1)	0.700	0.259	0.207	0.036	0.193	0.086
	(1.76)*	(1.51)	(0.65)	(0.98)	(2.97)***	(2.40)**
Democracy (-1)	-0.003	-0.000	-0.060	-0.001	0.022	0.021
	(0.07)	(0.02)	(1.84)*	(0.41)	(4.85)***	(8.18)***
Ethnic Fractional.	0.595	0.297	0.803	0.126	-0.005	0.065
	(1.05)	(1.36)	(2.02)**	(3.44)***	(0.08)	(1.82)*
Religious Fractional.	0.407	0.187	-0.949	-0.239	-0.453	-0.415
	(0.54)	(0.66)	(1.94)*	(5.32)***	(5.68)***	(9.49)***
Constant	-7.520	-3.565	-0.094	-0.366	-0.382	-0.355
	(4.55)***	(4.94)***	(0.07)	(3.24)***	(1.91)*	(3.23)***
Observations	4537	4537	4374	4379	4379	4379
(Pseudo) R2	0.12	0.12	0.09	0.06	0.05	0.07
Log Likelihood	-274.37	-274.01	-494.02			

Note: Logit regressions, unless reported otherwise. Dependent variable: War start, unless reported otherwise. Abs. value of z statistics in parentheses. *, **, *** = significant at 10%, 5%, 1% respectively. (-1) = first lag.

Table 6: Further robustness checks and other dependent variables with imputed education spending

shown in columns (1) and (2), the results are robust to running ReLogit and probit estimations. In columns (3) to (6) it is shown that education reduces the risk of coups, guerrilla warfare, political assassinations and general strikes at a significance level of 5%, respectively 1%.

Also quantitatively, the impact of education on the risk of civil war is substantial. A country year with all average characteristics and a level of education spending as percentage of GDP of 6% has the risk of a civil war outbreak in a particular period of 0.49%, while a country year with otherwise identical characteristics, but with an education spending of 2%, has a conflict risk of 1.04% - which is more than double.

In addition to the robustness checks reported in the paper, many more have been performed, and the conflict reducing impact of government spending and education is robust to these changes. A large number of different specifications has been tested, adding additional economic, social or geographical variables, without threatening the statistical significance of our main two explanatory variables, government and education spending.

6 Conclusion

The present contribution has focused on the impact of deprivation in unequal societies on the choices of players between appropriative and productive activities, and on the question of whether welfare state policies may be able to reduce the equilibrium level of appropriation. Conflict has been represented as mutual stealing, whereas a friction of stealing has been included. Using fully specified production functions has permitted both symmetrical outcomes, and the inclusion of inequality in capital endowments and in total factor productivity. It has been shown that population groups with a lower total factor productivity spend more time on appropriation.

In the present model, income taxation reduces the incentives for appropriation above all if the economy is stuck in a low production trap. For higher levels of production, under certain conditions the undesirable impact of distortions and disincentives for productive work due to taxation may prevail. Capital and land redistribution can reduce appropriation if not all capital is employed in production or if most of the capital and land inequality is within groups rather than between groups.

Education, health and anti-poverty spending have above all an appropriation-reducing impact if the total factor productivity is initially low. In a two-period framework, education and perspectives for a better future result in children accumulating less fighting capital and more production skills, which leads to a lower level of conflict in the long-run.

Further, the model has been empirically tested using logit estimations. Higher government and education spending have been found to lower the risk of civil wars. The results were statistically significant for different specifications and for several robustness checks.

The present contribution has succeeded in building a theoretical model and

performing empirical estimations of the impact of several widely-used welfare state policies on conflict behaviour. However, further research in this area should be encouraged: Generalising the results for an n-player framework would make a lot of sense. Testing the results of the present contribution empirically with micro-level data would also be an interesting research issue.

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Appendix

A description and sources of the data used are listed below.

Assassinations: Number of politically motivated murders or attempted murders of high government officials or politicians, from Banks (2005).

Civil war: This variable captures civil conflicts with at least 1000 fatalities per conflict. The data up to 1999 is from Fearon and Laitin (2003), and is updated for the years 2000-2004 using the same definition of civil wars and data from the database on "Armed Conflicts" of PRIO (2006).

Coups: Dummy variable taking a value of 1 if a coup occurred in a given country year, recoded from Banks (2005).

Debt service: Total debt service (% of GNI), from World Bank (2006b).

Democracy: Polity IV scores, from CIDCM (2007).

Education spending: Public spending on education as percentage of GDP, from World Bank (2006a).

Ethnic fractionalisation: Index of ethnic fractionalisation, updated variable from Fearon and Laitin (2003).

GDP per capita: Per capita gross domestic product in current US$, from World Bank (2006b).

GDP growth: Percentage change on previous year's level of GDP per capita (as defined above).

Government spending: Includes general government final consumption spending in percent of GDP, from World Bank (2006b).

Guerrilla: Number of any armed activity, sabotage, or bombing carried out by independent bands of citizens or irregular forces and aimed at the overthrow of the present regime, from Banks (2005).

Health spending: Public health expenditures as percentage of GDP, provided by the World Bank (2006b).

Instability: Dummy variable taking a value of 1 when there was instability in governing arrangements in any of the previous three years, following Fearon and Laitin (2003)'s definition and using Polity IV scores, from CIDCM (2007).

Mountainous Territory: Percentage of the territory that is mountainous, updated variable from Fearon and Laitin (2003).

New State: Dummy variable taking a value of 1 when a state was founded in the previous two years, updated from Fearon and Laitin (2003).

Non-contiguous states: Dummy variable taking a value of 1 when a state is not contiguous, updated variable from Fearon and Laitin (2003).

Oil exporter: Dummy variable taking a value of 1 when a country year had greater than 33% fuel exports, updated variable from Fearon and Laitin (2003).

People of 65 years and above: Expressed in percent of total, from World Bank (2006b).

Population: From World Bank (2006b).

Prior wars: Dummy variable taking a value of 1 when a previous war occurred in a given country.

Religious fractionalisation: Index of religious fractionalisation, updated variable from Fearon and Laitin (2003).

Rural population: Percentage of population living in rural areas, from World Bank (2006b).

Strikes: Number of general strikes of 1000 or more industrial or service workers that involve more than one employer and that are aimed at national government policies or authority, from Banks (2005).