How Does Relative Group Size Affect Civil War Risk?

Thorsten Janus

Abstract

The literature on social polarization predicts that redistributive conflicts will be most intense in societies with two equally large groups. However, the effect of relative group size on the risk of onset of violent conflict remains unexplored. In this paper we study a game between a rent-extracting government and an excluded social group which can explain the determinants of conflict onset and help to interpret the empirical civil war literature. Although the model is too complex to solve analytically the simulation results show that (1) the risk of conflict onset is maximized with two equally large groups, but (2) the onset risk in any given year depends on which group controls the government. (3) The relative size of excluded majority groups, their ability to overcome collective action problems, patience levels as measured by the discount factor, and natural resource rents can all have a non-linear effect on the risk of conflict onset.

Keywords: Civil war, social conflict, political exclusion

JEL Classification: D74, O11, O17

---

1. Introduction

Although the occurrence of social violence, such as revolutions, coups and terrorism, is likely to reflect many factors (Blattman and Miguel 2010), dissatisfaction with government policies and desire to change them may play a central role (World Bank 2011). Bates (1981, 2008), Horowitz (1985) and Chandra (2007), for instance, explain how political leaders exchange public goods, transfers, and security guarantees for votes from their social support base, and how perceptions of discrimination by excluded groups can lead to government or popularly initiated violence. The fact that governments can potentially avoid instability and the risk of being deposed by redistributing wealth makes it important to understand their trade-off between benefiting their constituents and minimizing the risk of non-constituents rising up against them.

In this paper we study a society containing two antagonistic social groups. In each period, one group controls the government and offers a tax or transfer policy to the excluded group. The excluded group then either accepts the policy or rejects it by attacking the ruling group. The unique Markov perfect equilibrium of the game determines the optimal tax/transfer offer, risk of violent conflict onset and continuation payoffs from being in control of the government relative to excluded, all as a function of the size ratio of the excluded group to the ruling group.

The model leads to several predictions which can potentially inform the empirical civil war literature. First, even though the social cost of conflict is maximized when the two groups are equally large, size symmetry appears to maximize the risk of conflict onset. Second, the effect of relative group size on conflict risk depends crucially on which group controls the government or otherwise gets to set the policy agenda which determines the wealth distribution. In the first two simulations we present, increasing the relative size of the majority group is politically stabilizing if and only if that group controls the government. However, our third simulation shows that the opposite case is possible over a parameter range, i.e. increasing the relative size of an excluded
majority group and shrinking the government’s social support basis can be politically stabilizing. Third, contrary to the common result in rent-seeking models that a greater the pool of non-produced wealth the greater the amount of redistributive conflict in society, increasing the exogenous income flow accruing to the government can potentially decrease conflict risk due to the optimal fiscal policy adjustment it generates. Fourth, while apriori one would expect collective action problems to facilitate elite rule and the ability of minority groups to retain power over majority groups, we show that collective action problems in the majority group can lead to less stable minority based regimes. The mechanism is again the endogenous setting of fiscal policy: the fact that collective action problems make an excluded majority a weaker political threat makes ruling minorities more bold and ruling majorities more timid in terms of rent-extraction, i.e., ruling minorities will increase tax rates (even as they know taxation increases conflict risk) and ruling majorities will decrease them. As it turns out, these indirect negative effects of collective action problems on the political stability of minority regimes can dominate the direct positive effect.

Although we believe the model is one plausible depiction of the political dynamic in divided societies with latent violence, just as with many other conflict models in the literature, it is of course difficult to know how far the results generalize. Nonetheless, we believe the model shows the following important general point: that the effect of relative group size, political office rents or economic shocks on the risk of social violence depends on the institutional and economic context they impact. In the model here, the effects depend on which group happens to control the government or more generally has the initiative in the group redistributive bargaining process. The effect of a size distribution change can additionally depend on the political office rent. To understand the effect of exogenous shocks it is important to understand the process of redistributive bargaining between social groups and the dynamic nature of group interactions. Such as general argument is consistent with Rodrik (1999) and recent evidence that different societies may be differentially vulnerable to economic shocks (Janus and Riera-Crichton 2013..)
Our primary finding is that the relative size of the excluded group can have a non-monotonic effect on the risk of violence. In other words, over a range of relative group sizes a smaller group ruling can be more secure in power than a larger ruling group. The reason is that, on one hand, a smaller ruling group is easier to dislodge from power and more tempted to increase taxation since the benefits will be concentrated among few recipients. On the other hand, smaller ruling groups know that they are weak and fear a bleak future of domination by the excluded group in case they are attacked. The latter two factors encourage decreased taxation and a smaller conflict risk ceteris paribus. We use a numerical example to show that, as the relative size of the excluded group increases, the risk of political instability can follow at least two patterns: a non-monotonic pattern where it decreases over an intermediate range of exclusion levels and a monotonically increasing pattern. In the former case, a ruling group constituting, say, 20% of the population can be as stable in power as the opposing group, constituting 80% of the population, would be if the roles were reversed. The model can therefore explain the ability of elites with quite limited popular support to retain power in certain ethnically divided countries (such as Burundi, Iraq, Rhodesia, Rwanda, South Africa, and Syria) and countries with strong class-based tensions (as in much of Latin America). It is also consistent with the lack of evidence linking measures of political inclusion, such as ethnic minority rule (Fearon et al. 2007) to civil war risk at least in linear regressions.

The model complements the theoretical literature on social polarization, which links the size distribution of competing social groups to the intensity of redistributive conflict (Esteban and Ray 1994, 1999, 2008, 2011). Our key departure from this literature is to link relative group size to the risk of onset of conflict rather than the intensity of conflicts once they start. The paper is further related to Chassang and Padro-i-Miquel (2009, CP) and a series of conflict models developed by Acemoglu and Robinson (2001, 2006, AR) and Besley and Persson (2008, 2009, 2011a,b, BP). We follow these authors in modeling social conflict as a repeated bargaining
problem where a falling opportunity cost of fighting is the proximate cause of civil war. We also depart from CP, AR and BP in several respects, however. First, we model bargaining under asymmetric information rather than imperfect commitment (Powell 2006). Second, we ask a different research question: “how does changing the relative size of the politically excluded population affect conflict risk under asymmetric information?” rather than “how can commitment problems cause conflict?” Third, our model allows the losers from conflict in the current period to challenge the winners in future years. In contrast CP and AR assume that a single period of political upheaval will settle the wealth distribution permanently and BP study self-interested individuals who can only engage in a single conflict during their lifetime. The empirical facts that the same social groups tend to fight repeatedly within countries and to claim to pursue the well-being of future generations suggest that their political decisions ought to incorporate a risk of conflict recurrence.

The model also differs from Siqueira and Sekeris (2012), who assume that an insurgent group and the government compete for popular support by committing to future policy platforms. While we believe such a modeling approach is appropriate when the population has many “swing voters” and politicians can commit to future behavior, our paper is motivated by conflicts where social groups have largely fixed boundaries, such as tribal, ethnic, religious and sectarian conflicts (Horowitz 1985, Easterly and Levine 1997, Alesina et al. 2003) and to a large extent Latin America’s class-based conflicts (Bethell 1994, Koonings and Krujit 1999, Sokoloff and Engerman 2000). Dal Bó and Powell (2009) show that when governments have to decrease transfers to the opposition in bad times, and the opposition cannot observe the government’s current wealth, the opposition may choose to attack whenever the transfer is less than a threshold. Although we share these authors’ focus on information asymmetry as a cause of war, the asymmetry here pertains to the opposition’s rebellion cost and not the government’s wealth. Our focus is also on linking the relative size of the excluded group rather than sovereign wealth shocks to conflict. The model likewise departs from previous asymmetric information-based
bargaining models of conflict (see Powell (2002) for a review) by linking conflict risk to the relative size of the bargaining groups and being dynamic rather than static.

In the remainder of the paper, Section 2 presents the theoretical framework. Section 3 provides simulation results showing that the effect of political exclusion on the risk of civil war onset may or may not be monotonic, and small ruling groups can be as stable in power as large groups. Section 4 summarizes, concludes and briefly discusses the implications of the analysis.

2. A Model of Political Exclusion and Civil War

We assume that a population of size one contains two distinct social groups. Group 1 has size \( n_1 \) and group 2 has size \( n_2 = 1 - n_1 \). The relative size of group 2 is denoted \( \alpha = n_2 / n_1 \). The assumption that the relative group size is fixed follows the bulk of existing civil war theories (CP, AR, BP, Alesina et al. 2003, Meirowitz and Sartori, 2008, Powell 1996, 2004, 2006, Dal Bó and Powell 2009) and the consensus in the social conflict literature that social divisions, such as class, region, religion, language or ethnicity based divisions, tend to be long-standing and run deep (Horowitz 1985, Easterly and Levine 1997, Alesina et al. 2003). Individuals discount future payoffs by \( \delta \in (0,1) \) and earn a group-specific per-capita income \( y_i \). In any period in which group \( i = 1,2 \) controls the government it attempts to collect \( \tau_i - \phi \tau_i^2 / 2 \) per person in the excluded group, where \( \tau_i \) is a tax and \( \phi \tau_i^2 / 2 > 0 \) is a standard efficiency loss from taxation. If \( \tau_i < 0 \) the ruling group makes a transfer to the excluded group (i.e., it sets a negative tax). We interpret \( \tau_i \) broadly to include all policies that redistribute from the excluded group to the ruling group. For example, even if a government does not tax the excluded group heavily, its decisions regarding industry-specific subsidies or education access may favor its members. Thus, whenever group 1 controls the government, taxation brings \((\tau_1 - \phi \tau_1^2 / 2)\alpha\) to each group 1 member. Whenever group 2 controls the government, taxation brings \((\tau_2 - \phi \tau_2^2 / 2) / \alpha\) to each
group 2 member. For generality we also allow the ruling group to collect an office rent of $R \geq 0$, which could be foreign aid or natural resource revenues. Alternatively, it could be taxes on national residents other than the two antagonistic groups.

After the government announces the tax in each period, the excluded group can either accept the policy or rebel. Rebellion has three consequences: (1) the excluded group avoids taxation, (2) the incumbent group loses a fraction of its income $\sigma$ and a fraction $\omega$ of the office rent due to fighting, and (3) the excluded group overthrows the incumbent group and takes control of the central government. We further assume that the cost of rebelling is known to the excluded group but unobserved by the ruling group, as in Fearon (1995) and Powell (2004). The cost of rebelling is measured as a fraction of income and has a cumulative distribution function

$$F_i(\mu_i|\alpha).$$

(1)

which we assume has an non-decreasing hazard rate (which is satisfied by the normal, uniform, exponential and many other distributions). Increasing the relative size of group 2 shifts the distribution for its rebellion cost up (thus decreasing the expected cost), $\partial F_2(\mu_2|\alpha)/\partial \alpha > 0$, while the corresponding distribution for group 1 shifts down, $\partial F_1(\mu_1|\alpha)/\partial \alpha < 0$.

The timing in each period is the following. (1) The excluded group learns the rebellion cost. (2) The ruling group sets the tax policy. (3) The excluded group chooses to either pay taxes or rebel.

---

2 Like AR, CP and BP we assume that any collective action problems within social groups can be resolved (although resolving them may be costly, see Section 3). For example, insurgent groups may motivate their members with monetary incentives, security provision, or the prospects of future political power or getting to engage in looting, smuggling, or other illegal activities (Keen 2001, World Bank 2003). Non-economic incentives based on identity, ideology or indoctrination may also be important (Weinstein 2005, Beber and Blattman 2008).
If it rebels, it starts as the ruling group next period, while the former incumbent starts out of power. Otherwise the ruling group stays in power. Like AR and BP we focus on finding a Markov Perfect Equilibrium. In a Markov Perfect Equilibrium the players’ strategies can only depend on the current state variable – which group is in power - and any preceding moves within the same period. Thus, the excluded group simply reacts to the current tax rate, which the ruling group sets to maximize its payoff.

Before proceeding, we note that there is also a slightly different interpretation of the model. Suppose that neither group knows the rebellion cost, but after the tax is set the two groups simultaneously observe the rebellion cost. In principle the government could now adjust the tax level to avoid conflict, but in practice doing so may be difficult. For example, the ruling group’s representatives in the central government may have already delegated taxation rights to local elites. Each local elite may be unwilling to decrease taxation in its locale in order to prevent civil war in society as a whole. We believe this interpretation is empirically plausible, although it may require additional assumptions. The reason is that, once the rebellion cost is known, the ruling group members have incentive to coordinate on making the minimum payment needed to prevent rebellion. Due to the knowledge that paying just slightly less would trigger conflict, no individual would want to free-ride on the payments of others. If each individual does not expect the others to pay, however, they may fail to coordinate, so there will still be a conflict equilibrium. If further each individual cannot be sure that her payment is crucial to avoid conflict due to extrinsic uncertainty there will be free-riding (Holmström 1982, Rasmusen 2006).

\[
V^o_1 = p_1(\tau_1)(y_1 + \alpha(\tau_1 - \phi \tau_1^2 / 2) + R(1 + \alpha) + \delta V^o_1) + (1 - p_1(\tau_1))(1 - \sigma)y_1 + (1 - \omega)R(1 + \alpha) + \delta V^o_1)
\]

where \( V^o_1 \) is the value of starting a period excluded from power,

\[
\tilde{V}^o_1 = p_2(\tau_2)(y_1 - \tau_2 + \delta \tilde{V}^o_1) + (1 - p_2(\tau_2))(\tilde{u}_1^R + \delta \tilde{V}^o_1),
\]
and $p_i(\tau_i)$ is the probability that a power-holding group $i$ avoids an overthrow. We compute this value momentarily. The term $R(1+\alpha) = R(n_1/n_1 + n_2/n_1) = R(1/n_1)$ is the office rent per member of group 1. The variable $\bar{u}^R_i, i=1,2$ is the expected per-period payoff for a rebelling group $i$, which we also compute momentarily. Note that because the environment is stationary the two continuation values $\bar{V}_1^o$ and $\bar{V}_1^p$ are fixed.

After observing $\tau_1$, group 2 rebels if the cost of rebelling per capita is below the benefit:

$$y_2 - \tau_1 + \delta \bar{V}_2^o < y_2 - \mu_2 y_2 + \delta \bar{V}_2^p \iff$$

$$\mu_2 < (\tau_1 + \Delta V_2)/y_2, \quad (4)$$

where

$$\Delta V_i = \delta(\bar{V}_i^p - \bar{V}_i^o), \quad i = 1,2 \quad (5)$$

is group $i$’s power premium or net benefit from being in power compared to excluded from power. Substituting (4) into (1) gives the likelihood of civil war onset

$$1 - p_i(\tau_i) = \text{prob}(\mu_2 y_2 < \tau_1 + \Delta V_2) = F_2((\tau_1 + \Delta V_2)/y_2|\alpha). \quad (6)$$

Equation (6) shows that $\partial p_i/\partial \tau_1 = -\partial F_2(c_2|\alpha)/\partial \alpha < 0$: group 1 is more likely to provoke an insurgency and get replaced the more it taxes group 2. By analogy to (4) group 1 will rebel when it is out of power whenever $\mu_i < (\tau_2 + \Delta V_i)/y_1$, so
\[ \bar{u}_i^R = E((y_i - \mu_i y_i) | \mu_i < (\tau_2 + \Delta V_1) / y_i) \]  

(7)

The optimal tax rate \( \tau_1 \) maximizes (2), implying

\[ \alpha(1 - \phi \tau_1) = (-p_i / p_i)(\sigma y_1 + \alpha(\tau_1 - \phi \tau_1^2 / 2) + \omega R(1 + \alpha) + \Delta V_i) \]  

(8)

where from (6) \( -p_i / p_i = f_2(\tau_1 | \alpha) [1 - F_2(\tau_1 | \alpha)] \)

Equation (8) equates the marginal benefit of taxation on the left hand side to the hazard rate for political stability, \(-p_i / p_i\), times the loss induced in case of rebellion. The hazard rate for political stability is the likelihood that a marginal increase in the tax rate pushes group 2 to rebel.

The ruling group \( 1 \)'s income loss in case of rebellion is the sum of current income, tax revenues, and non-tax office rents, plus the loss from being excluded from power next period \( \Delta V_1 \).  

Solving (2) and (3) for \( V_1^p \) and \( V_1^o \), and subtracting the latter from the former, gives the power premium

\[ \Delta V_1 = \frac{\delta}{1 - \delta(p_1 + p_2 - 1)} p_i (\sigma y_1 + \alpha(\tau_1 - \phi \tau_1^2 / 2) + \omega R(1 + \alpha) - (p_2 (y_1 - \tau_2) + (1 - p_2) \bar{u}_i^R)) \]  

(9)

Equations (6)-(9), along with their analogues for group 2, jointly determine the likelihood of civil war \( (1 - p_i) \), expected per-period utility from rebelling \( \bar{u}_i^R \), the optimal tax \( \tau_i \), and the power premiums \( \Delta V_i \) for \( i = 1, 2 \). The eight equations for \( \{p_i, \bar{u}_i^R, \tau_i, \Delta V_i\}, i = 1, 2 \) define the equilibrium.

3 Since the marginal benefit on the left hand side of (8) is decreasing and the marginal cost on the right hand side is increasing in \( \tau_1 \) (recall \( \Delta V_1 \) is fixed and the government would never operate on the wrong side of the Laffer curve) the second-order condition holds and the equilibrium is unique.
**How does relative group size affect civil war risk?**

Although the model is difficult to solve analytically, it is possible to obtain some intuition under the simplifying assumption that the discount factor approaches zero, i.e., $\delta \to 0$. In this case the power premium (9) and its analogue for group 2 are effectively zero ($\Delta V_1 \approx \Delta V_2 \approx 0$) because individuals disregard the future. Equation (8) now gives the optimal tax level $\tau_1$ as an implicit function of purely exogenous parameters:

$$\alpha(1-\phi_1) = -\left[ \frac{p_1'(\tau_1|\alpha)}{p_1(\tau_1|\alpha)} \right] \left[ \sigma \gamma_1 + \alpha(\tau_1 - \phi_1^2 / 2) + \omega R(1+\alpha) \right]. \quad (8')$$

Equation (8’) equates the marginal benefit of taxation (the revenue gain per ruling group 1 member) on the left hand to the marginal cost (the hazard rate of political stability $p_1'(\tau_1|\alpha)/p_1(\tau_1|\alpha)$ times the loss from rebellion) on the right hand side. Equation (6) gives the likelihood of civil war onset as

$$1 - p_1(\tau_1) = F_2(\tau_1|\alpha) \quad (6')$$

Our primary focus is how increasing the relative size of the excluded population affects conflict risk (6’). For a given tax level $\tau_1$, an increase in $\alpha$ increases conflict risk, $\partial F_2(\tau_1|\alpha)/\partial \alpha > 0$, since when group 2 is larger its per capita cost of rebelling decreases. However, the rise in $\alpha$ can potentially also decrease the optimal tax level $\tau_1$ and therefore indirectly decrease conflict risk.

To see the effect via taxation, consider in turn the three terms in (8’):
(a) The term \(\alpha(1 - \phi \tau_1)\) is the marginal benefit for group 1 members from raising the tax level. Since a higher \(\alpha\) means that fewer group 1 members share revenues from a larger tax base of group 2 members, group 1’s marginal benefit from taxation increases. All else constant, the rise in the marginal benefit \(\alpha(1 - \phi \tau_1)\) due to a higher \(\alpha\) increases the optimal tax \(\tau_1\).

(b) The term \(-\dot{p}_1 / p_1 = f_2(\tau_1 | \alpha)\left[1 - F_2 (\tau_1 | \alpha)\right]\) - the hazard rate of political stability or likelihood that a marginal tax increase will push group 2 to rebel - also increases with \(\alpha\). Intuitively, increasing the relative size of group 2 decreases its cost per capita of attacking group 1. Since a marginal tax increase is therefore more likely to push group 2 to rebel, group 1 has a stronger incentive to tax cautiously. The rise in the hazard rate due to a higher \(\alpha\) thus decreases \(\tau_1\).

(c) The term \(\alpha(\tau_1 - \phi \tau_1^2 / 2) + oR(1 + \alpha)\) is the sum of the tax-generated and the exogenous office rents per group 1 member. When \(\alpha\) is higher fewer group 1 members share the office rent, so the rent per member increases. As a result, group 1 has more to lose from provoking rebellion for any given tax level \(\tau_1\). Having more to lose encourages less taxation in order to decrease rebellion risk. The rise in the tax-generated office rents therefore also decreases \(\tau_1\).

Comparing the change in taxation incentive (a)-(c), the greater the value of \(b\) - the greater the majority’s size advantage in case of civil war - the greater is the tax-decreasing effect of a rising hazard rate when \(\alpha\) increases. For sufficiently high \(b\) values, therefore effects (b) and (c) will dominate effect (a). In that case, increasing \(\alpha\) decreases the optimal tax \(\tau_1\). Provided \(\tau_1\) falls sufficiently, a higher degree of political exclusion as measured by \(\alpha\) will decrease the conflict risk \((6')\).
3. Simulation Assumptions

We simulate the model by setting the discount factor to $\delta = 0.95$, the per capita incomes to $y_1 = y_2 = 1$, the tax distortion parameter to $\phi = 1$ and the ruling group’s lost income share in case of conflict to $\sigma = 1$. Unless otherwise stated we also set the lost office rent share to $\omega = 1$.

Unfortunately there is no data source allowing one to estimate the empirical distribution of rebellion costs, however. For lack of a better option and due to the analytical simplicity it offers, we focus on the exponential distribution

$$F_i(\mu|\alpha) = 1 - e^{-\lambda_i(\alpha)\mu}, c_i \geq 0, \ i = 1, 2,$$

where the mean insurgency costs facing group 1 and group 2 members, $1/\lambda_i$, are

$$\frac{1}{\lambda_1} = 2\alpha^b$$

(11)

$$\frac{1}{\lambda_2} = 2\alpha^{-b}.$$  

(12)

In equations (11) and (12), $b \geq 0$ measures the magnitude of group 2’s expected per-capita rebellion cost relative to that of group 1. To see this, note that the ratio of means for the two cost distributions (the mean group 2 cost relative to the mean group 1 cost) is $\alpha^{-2b}$. If, for instance, group 2 is $\alpha = 5$ times larger than group 1, but $b = 0$, then the expected per capita cost of rebelling is the same for the two groups. If $b = 0.5$, then group 2’s expected per capita cost is $1/5$ of the expected per capita cost for group 1, etc. Generally, if group 2 is larger than group 1 (12

4. Numerical simulation cannot guarantee that the solution is a unique. However, we have confirmed that the analytical solution for a group 2/group 1 size ratio ($\alpha$) equal to one is unique. Since the endogenous variables change smoothly as $\alpha$ changes from one, it seems unlikely that the simulations jump across equilibriums.
\( \alpha > 1 \) its relative rebellion cost decreases with \( b \) and if group 2 is smaller (\( \alpha < 1 \)) its relative cost increases with \( b \). Another interpretation of \( b \) is therefore that it measures the size advantage of the majority group. The magnitude of this advantage is likely to depend negatively on the incidence of free-riding or other collective action problems. Given that both the sociological literature on social movements (Olson 1971, Granovetter 1978, Oliver 1993, Oliver and Marwell 1992, Marwell and Oliver 1993, Kim and Bearman 1997, Chwe 1999) and the recent economics and political science literature on the organization of insurgencies (Gates 2002, World Bank 2003, Garfinkel 2004, Mkandawire 2004, Weinstein 2005, 2007, Beber and Blattman 2008, Blattman and Miguel 2010) suggest that collective action problems in political organizations can be severe, it seems likely that \( b \) should be somewhat below unity.

The simulation now proceeds by substituting (10)-(12) into (6)-(9) and their analogues for group 2. For example, equations (6)-(9) for group 1 are now

\[
p_1(\tau_1) = e^{-\lambda_1(\tau_1 + \Delta V_1)/y_2}
\]

\[
\bar{u}_1^R = \int_{\mu_1=0}^{(\tau_2 + \Delta V_1)/y_1} \frac{y_1(1 - \mu_1)e^{-\lambda_1\mu_1}d\mu_1}{1 - e^{-\lambda_1(\tau_2 + \Delta V_1)/y_1}} = y_1\left(1 - 1/\lambda_1 + \frac{(\tau_2 + \Delta V_1)e^{-\lambda_1(\tau_2 + \Delta V_1)/y_1}}{1 - e^{-\lambda_1(\tau_2 + \Delta V_1)/y_1}}\right)
\]

\[
\alpha(1 - \phi \tau_1) = (\lambda_1/y_2)(\sigma y_1 + \alpha(\tau_1 - \phi \tau_1^2/2) + \omega R(1 + \alpha) + \Delta V_1)
\]

\[
\Delta V_1 = \delta \frac{p_1(\sigma y_1 + \alpha(\tau_1 - \phi \tau_1^2/2) + \omega R(1 + \alpha)) - (p_2(y_1 - \tau_2) + (1 - p_2)R^R)}{1 - \delta(p_1 + p_2 - 1)}.
\]

4. Results

Figures 1-3 plot the results for \( \{p_i, \tau_i, \Delta V_i\}, i = 1,2 \) as the group 2-to-group 1 size ratio \( \alpha \) increases along the horizontal axis. Figure 1 assumes a large majority size advantage and a positive office rent (\( b = 0.8, R = 0.5 \)). Figure 2 decreases the size advantage but keeps the office
rent constant \((b=0.4, R=0.05)\). Figure 3 further decreases the office rent \((b=0.4, R=0.01)\). Since the groups are symmetric, Figures panels a-b in each figure assume, without loss of generality, that group 2 is larger than group 1 \((\alpha \geq 1\) rather than \(\alpha \leq 1\)). The results for group 1 therefore predict political stability, taxation and the power premium when the government is minority-controlled. The results for group 2 predict the same outcomes under majority control. In panel b we also compute political stability in the average period as follows: the proportion of time group 1 starts in power is \(q_i = q_1 p_1 + (1-q_1)(1-p_2)\), where the first term is the probability that group 1 started in power last period and stayed in power, and the second term is the probability that it took power last period. Since this solves to \(q_i = \frac{(1-p_2)}{(1-p_1)+(1-p_2)} = 1-q_2\), political stability is \(q = q_1 p_1 + q_2 p_2 = \frac{p_1 + p_2 - 2p_1 p_2}{2-p_1-p_2}\). Finally, panel c in each figure summarizes the effect of the excluded population on political stability by plotting the stability of a group 1 regime, \(p_1\), as the group 2/group 1 size ratio \(\alpha\) ranges from 1/9 to 9 or, equivalently, the population share of the government’s support basis falls from 90% to 10%. In the following we focus on the results for political stability and therefore the inverse risk of conflict onset.

### 4.1. The effect of relative group size

In all three figures, the average level of political stability increases with the relative group size ratio. The risk of onset of civil war is maximized when the groups are equally large. This prediction is on one hand consistent with the notion in the social polarization literature that having multiple large groups will lead to more conflict than having either a single group or many small groups. On the other hand, however, the formal models in the polarization literature have focused entirely on conflict intensity as measured by rent-seeking expenditures, while either ignoring the determinants of conflict onset or suggesting a non-monotonic or negative relationship with polarization:
“.. our paper does not address the issue of conflict onset. As discussed in Esteban and Ray (2008a), the knowledge of the costs of open conflict may act as a deterrent. For this reason we argue there that the relationship between conflict onset and the factors determining the intensity of conflict may not be monotonic. This issue is not contemplated here: we assume that society is in a state of conflict throughout”

(Esteban and Ray 2011, p. 1346)

“When society is highly polarized, the potential cost of rebellion is extremely high, and this cost may serve as the guarantor of peace. So, in highly polarized societies, the occurrence of open conflict should be rare but its intensity very severe, whenever it happens.”

(Esteban and Ray 2008, abstract)

The reason polarization increases the risk of conflict onset in the preceding simulations is not just related to the conflict cost, but to the endogenously determined benefit of fighting. To illustrate this point, Figure 4 shows the average per capita utility across rebelling groups, 

\[ \bar{u}^R = q_1 \bar{u}_2^R + q_2 \bar{u}_1^R \bar{u}_2^R, \]

corresponding to the simulations in Figures 1 and 2. With the former parameters polarization (i.e., size symmetry) increases rebel utility and therefore decreases the conflict cost, but with the latter parameters it increases the cost. Nonetheless, we know that polarization increases conflict onset risk in both simulations. The reason is that the polarization level or inverse group size also affects the benefits of fighting. In particular, the group size ratio changes the number of individuals in each group who will share future tax revenues, the likelihood of retaining and regaining power in the future as well as the optimal future tax rates.\(^5\)

The net effect of increasing polarization or size symmetry then turns out to be positive in all three simulations. A positive effect of polarization on conflict onset may be consistent with the evidence in Janus and Riera-Crichton (2014) linking economic downturns to increased conflict risk in societies with ethnic dominance or high ethnic polarization, but not in other societies.

\(^5\) Compared to the polarization-and-conflict models of Esteban and Ray (1999, 2008, 2011), this paper arguably lacks a micro-foundation for the costs of fighting, but models the benefit side more carefully by assuming a dynamic game. We plan to develop the micro-foundations for rebel organization in the game in the future.
4.2. The effect of government control

For any given relative size ratio in the three figures, political stability depends on which group controls the government. The civil war risk is $1 - p_1$ under group 1 control and $1 - p_2$ under group 2 group control. In figures 1 and 2 the war risk is always lower when group 2, the majority group controls the government. However, Figure 3 shows that the combination of collective action problems in the majority group and low office rents can make minority based regimes more stable than majority based regimes. The risk of conflict onset in panel c is therefore no-longer monotonic in the size of the government’s support basis: minority regimes are more stable than majority based regimes as long as the group size ratio is below four. The non-monotonic effect of political exclusion in Figure 3 is consistent with Fearon et al. (2007), who find no evidence linking the presence of heads of state from ethnic minorities to civil war.

4.3. The effect of collective action problems

Collective action problems in the majority group should result in a decrease in the majority’s size advantage as measured by the parameter $b$ in the simulations. It follows from (10)-(12) that the direct effect is to shift the rebellion cost distribution for group 1 upward and the distribution for group 2 downward. A first guess is therefore that collective action problems will stabilize minority regimes (increasing $p_1$) and destabilize majority regimes (decrease $p_2$). However, in addition to these direct effects of collective action problems there will be indirect effects via the endogenous tax and power premium variables. For example, while (12) and (13) imply that $\frac{\partial p_1}{\partial b} = (\frac{\partial p_1}{\partial \lambda_1})(\frac{\partial \lambda_1}{\partial b}) < 0$ when we ignore the effects on $\tau_1$ and $\Delta V_2$, the inequality might reverse if $\tau_1$ and/or $\Delta V_2$ fall sufficiently. In fact, when we plot the regime-specific and average political stability levels $p_1, p_2$ and $q$ curves from figures 1 and 2 jointly in Figure 5, we find that the indirect effects of collective action problems tend to dominate, so collective action problems actually stabilize majority based regimes and destabilize minority based regimes. The
only exception is that below a size ratio of 2.3 collective action problems stabilize both minority and majority regimes, so the direct effect of collective action problems dominates in the case of group 1. Even then, however, the effect on political stability is too small to be visible in Figure 5. Although collective action problems must necessarily decrease the majority group 2’s welfare, therefore (due to the envelope theorem) they can have counter-intuitive effects on the stability of both majority and minority based governments. Figure 5 also shows that the effect of collective actions problems on political stability in the average time period can be ambiguous: a magnification of Figure 5 shows that the average stability curves for low and high majority cohesion levels do in fact cross.

4.4. The effect of patience

Figure 6a shows the effect of increasing the discount factor in the Figure 2 simulation (where $b = 0.4, R = 0.5$) from 0.95 to 0.99. Increasing the patience level of the two groups destabilizes both regime types so the average stability level also decreases. The problem is that the increasing $\delta$ increases the power premium (16) and its analogue for group 2. Any excluded group is now more willing to suffer through a year of violent rebellion in order to get to control the government. As a result, unless the optimal tax rate set by the incumbent group falls more than the power premium of the excluded group increases, the probability of avoiding rebellion in (13) decreases. However, when we increase the discount factor in the Figure 3 rather than Figure 2 simulation (so with a lower office rent) Figure 6b shows that the indirect effect via the tax rate to dominate: increasing patience now stabilizes majority based regimes while still destabilizing minority based regimes, and the effect on average period stability is now ambiguous since the average stability curves cross.
4.5. The effect of political office rents

As might be guessed from inspecting (13)-(16), the effect of increasing the office rent $R$ is qualitatively similar to the effect of increasing the discount factor. Although unreported results show that increasing the rent in the Figure 1-3 simulations always increases average political stability, Figure 7a shows that minority regimes in the Figure 3 simulation become less stable. Figure 7b further shows that if we double the taxation inefficiency parameter $\phi$ the effect of the rent on average stability too becomes ambiguous.

The ambiguous effect of office rents on conflict onset risk contrasts somewhat with Acemoglu et al. (2006) and Besley and Persson (2008, 2009), who predict a positive effect of natural resource rents on civil war because, in their models, a greater conflict prize makes revolutionaries more willing to incur the cost of violence. Aslaksan and Torvik (2006) also predict a positive effect as resource rents increase the payoff from violent relative to electoral conflict.\(^6\) The different qualitative effect of office rents on civil war onset in this paper reflects that a ruling social group can be displaced from office in the future and prefers to limit taxation and effectively share the office rent with the opposition in order to limit displacement risk. The endogenous fiscal policy response can mitigate and even counter the direct positive effect of the office rent on conflict risk. The theoretically ambiguous effect in the present paper is consistent, however, with the lack of robust evidence linking natural resource income, foreign aid and other office rent measures to civil war onset in the large empirical civil war literature (Ross 2004, Frankel 2010, van der Ploeg 2011, Nunn and Qian 2013). It is also consistent with the claim in the political science literature that office rents can create stable “rentier states” by easing the government’s financing constraint and helping it buy off the opposition (Acemoglu et al. 2004, Smith 2004, Basedau and Lay 2009). It is worth noting that the potentially negative civil war effect of office rents in this paper is slightly different however: rents can be stabilizing not

---

because they ease the government financing constraint – which we implicitly assume is not binding – but by creating a kind of “efficiency wage” for staying in power. Formally, the rents promote conflict in the model by increasing the power premium $\Delta V_2$ in the group 2-analogue of (16) and decreasing political stability $p_1$ in (13). On the other hand, the greater rent makes the government want to change the optimal value of $\tau_1$, and if it falls by a large enough amount then $p_1$ will actually increase. For example, in Figure 7a we plot the $p_1$ and $p_2$ curves from figure 3 together with the corresponding curves for a slightly higher office rent. Figure 7a predicts a clear stabilizing effect of office rents, i.e., office rents decrease civil war risk. However, Figure 7b shows that if the parameter capturing the inefficiency of the tax system is slightly higher, then the effect of office rents on political stability becomes ambiguous. In other words, the indirect effect of office rents on civil war onset can in principle outweigh the direct positive effect.

4. Conclusion

This paper has presented a simple repeated bargaining-model of conflict with asymmetric information. The model can generate a non-monotonic effect of political exclusion on civil war risk due to two sets of countervailing effects of exclusion. On one hand, a smaller relative size of the ruling group makes it less able to resist rebellion, and with fewer supporters to share the spoils from taxation it is tempted to tax more. Both factors increase civil war risk. On the other hand, since the regime knows it is weak, has a high tax-based office rent and fears future victimization at the hands of the presently excluded group, it is tempted to decrease taxation in order to deter rebellion. Simulating the model shows that, over an intermediate range of political exclusion levels, the latter two effects can dominate the former two, so increasing political exclusion can decrease civil war risk. For example, Figure 1 showed that a government supported by only 20% of the population can be as stable as the 80% population group opposing it would be if the roles were switched. The model can therefore explain the ability of elites to control substantially larger numbers of non-elite individuals through much of human history and
the stability of ethnic minority based regimes even in countries with sharp ethnic divisions, such as Apartheid South Africa. It is also consistent with the lack of empirical evidence linking political inclusion measures, such as ethnic minority rule and democracy scores, to the risk of civil war onset. Like the relative size of the ruling social group, increasing discount factors and political office rents can similarly have an ambiguous risk on civil war onset.

In terms of policy implications it is important to note that, even if a political entity may be less civil war-prone when a particular social group controls the government, any international effort to support that group is likely to change its political calculus (Lucas 1976). For instance, external military guarantees, as France has offered West African regimes historically, may diminish governments’ fear of rebellion and encourage increased rent extraction from the excluded population. Kuperman (2005) similarly argues that humanitarian interventions can act as a subsidy to rebellion. Easterly (2011) suggests that supplying aid to “benevolent autocracies” can erode their incentives to act benevolently. One avenue for future research is therefore to incorporate international policies in the model from the outset.
References


Powell, R. 2006. War as a Commitment Problem”, International Organization, 60, 169-203


Smith, Benjamin. "Oil wealth and regime survival in the developing world, 1960–1999."


Van der Ploeg, Frederick. "Natural resources: curse or blessing?." Journal of Economic Literature (2011): 366-420


Figure 1a: Political stability, taxes and power premiums under minority and majority rule with large majority size advantage ($b = 0.8$) and a positive office rent ($R = 0.5$). $>$, $\wedge$ show political stability; $+$, $o$, taxation; and $\ast$, $\bullet$ power premiums under group 1 and group 2 rule (respectively, $p_1, p_2, \tau_1, \tau_2, \Delta V_1$, and $\Delta V_2$).
**Figure 1b:** $> \land (p_1 \land p_2)$ magnified from Figure 1a, $\hat{\diamond}$ shows average stability.

**Figure 1c:** Political stability as the ruling group ranges from 90% of the population to 10%.
Figure 2a: Political stability, taxes and power premiums under minority and majority rule with small majority size advantage ($b = 0.4$) and a positive office rent ($R = 0.5$). $>$, ^ show political stability; +, o, taxation; and *, • power premiums under group 1 and group 2 rule (respectively, $p_1, p_2, \tau_1, \tau_2, \Delta V_1$, and $\Delta V_2$).
Figure 2b: $\uparrow$ (and $p_1$ and $p_2$) magnified from Figure 2a, $\diamond$ shows average stability.

Figure 2c: Political stability as the ruling group ranges from 90% of the population to 10%.
Figure 3a: Political stability, taxes and power premiums under minority and majority rule with small majority size advantage \((b = 0.4)\) and without office rent. \(\triangleright\), \(\triangleleft\) show political stability; \(\ast\), \(\circ\), taxation; and \(\ast\), \(\cdot\) power premiums under group 1 and group 2 rule (respectively, \(p_1, p_2, \tau_1, \tau_2, \Delta V_1, \text{and} \ \Delta V_2\)).
Figure 3b: > and \( p_1 \) and \( p_2 \) magnified from Figure 3a, ◇ shows average stability.

Figure 3c: Political stability as the ruling group ranges from 90% of the population to 10%.
**Figure 4:** The relationship between polarization (group size symmetry) and the cost of attacking.

- and *show average rebel utility in Figures 1 and 2, respectively.
Figure 5: The effect of majority size advantage on political stability. .>, ^ and ◇ show political stability under group 1 rule, group 2 rule and in the average time period in Figure 1 (with a large majority size advantage). ●, * and □ show the outcomes in Figure 2 (with a small size advantage).
**Figure 6a:** The effect of the discount factor on political stability. >, ^ and ◇ show political stability under group 1 rule, group 2 rule and the average period in Figure 2. *, ●, and □ show the effects of increasing the discount factor from 0.95 to 0.99.

**Figure 6b:** The effect of the discount factor on political stability. >, ^ and ◇ show political stability under group 1 rule, group 2 rule and the average period in Figure 3. *, ●, and □ show the effects of increasing the discount factor from 0.95 to 0.99.
**Figure 7a:** The effect of the political office rent on political stability. .>, ^ and ◇ show political stability under group 1 rule, group 2 rule and the average period in Figure 3. *, ●, and □ show the effects of increasing the office rent from 0.01 to 0.11.

![Graph showing political stability](image)

**Figure 7b:** The effect of the political office rent on political stability. .>, ^ and ◇ show political stability under group 1 rule, group 2 rule and the average period with the Figure 3 parameters except that \( \phi = 2 \). *, ●, and □ show the effects of increasing the office rent from 0.01 to 0.11.

![Graph showing political stability](image)