Journal of Global Peace and Conflict
June 2017, Vol. 5, No. 1, pp. 1-10
ISSN: 2333-584X(Print), 2333-5858(Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/jgpc.v5n1a1
URL: https://doi.org/10.15640/jgpc.v5n1a1

Warlord Led Civil Conflicts for Natural Resources: Policy Options for Conflict Resolution

Md. Didarul Hasan, Ph.D.
Department of Economics
Asian University for Women
Chittagong, Bangladesh

Sajal Lahiri, Ph.D.
Department of Economics
Southern Illinois University Carbondale
Carbondale, IL 62901, U.S.A.

Abstract

We develop a two-period model linking natural resources to civil conflicts led by warlords. Contrary to the existing literature, we assume that both resource extraction and wage rate are endogenous. We examine some policy options for the international community as well as for the conflict-affected country. We find that current sanction on resource exports is always counter-productive. However, a threat of future sanction unambiguously reduces conflict. An improvement in agricultural productivity may also limit the conflict. Our results also suggest that the most effective policy for conflict resolution is a bilateral piece-meal reduction in war efforts.

Keywords: Natural Resources, Civil Conflicts, Warlords, Sanctions.

JEL Classification: C72, D74, O13, Q34

1 Introduction

Since the end of World War II almost a third of all nations has experienced civil wars, defined as intra-state war with more than 1000 battle death in a single year (Blattman and Miguel, 2010). The number of armed conflict rose steadily through the last half of twentieth century, peaking in the early 1990s, and then has been showing a declining trend (see figure 1). Most of these conflicts are intrastate or civil conflicts. During the last 60 years, civil conflicts have been associated with approximately 20 million deaths (Besley and Persson, 2008). A civil war also destroys physical infrastructure and human capital, weakens the rule of law, displaces hundreds of thousands of people, and causes the spread of pandemics (Crost et al., 2014). The internal conflict is not only pervasive, it is also persistent. Almost 70% of all conflicts took place in countries where multiple conflicts were recorded (Collier and Hoeffler, 2004). According to the World Development Report (2011), a civil conflict costs the average developing country roughly 30 years of GDP growth, and countries involved in protracted conflicts can fall over 20 percentage points behind in overcoming poverty.

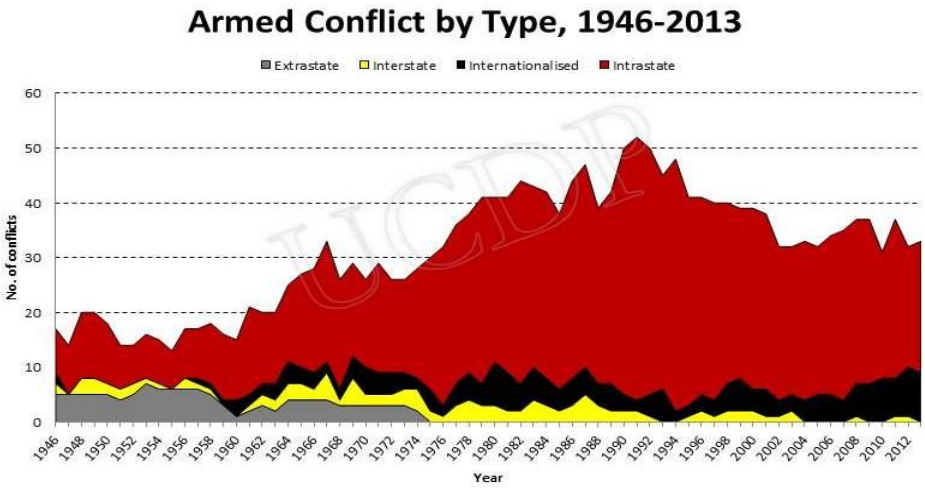

Figure 1: Number of armed conflict by year and type, 1946-2013

Source: UCDP/PRIO armed conflict dataset. "An armed conflict is a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in one calendar year."

The abundance of natural resources has been blamed for civil conflict in different parts of the world. Many scholars have studied empirically the relationship between natural resources and civil war since the publication of the seminal paper by Collier & Hoefller (1998).[1] What motivates civil war? Collier and Hoefller (2004) distinguish between two motives of civil wars: grievance and greed. Grievances due to inequality in terms of political and economic rights, inequality of income and wealth, and ethnic or religious divisions may cause civil war between different groups in a society. Greed comes in the form of competition between warlords for the appropriation of valuable resources. Using data of civil wars from 1960 to 1999, Collier and Hoeffler (2004) find that greed motives have a greater explanatory power than grievances to explain the onset and intensity of civil war.

Contrary to the huge number of empirical literature, the theoretical literature on the linkage between natural resources and civil conflict is rather small (see, for example, Torvick, 2002; Olsson and Fors, 2004; Maxwell and Reuveny, 2005; Holder, 2006; Olsson, 2007; Janus, 2012).[2] Most of these existing theoretical models treat natural resource stock as an exogenously given conflict prize. But, in reality natural resources can be, and are often, extracted and sold during the conflict. Rebels may consider rebellion as a business and their main motive is to capture resources during a conflict (Collier et al., 2004). However, rebel groups often rely upon revenues obtained from the selling of natural resources to sustain conflict financially (see, for example, World Bank, 2003; Ross, 2004; Lujala et al., 2005; UN, 2005; Humphreys and Weinstein, 2008).[3] In this paper, we develop a general equilibrium model of civil conflict. Our model has many similarities with that of Janus (2012), but with important differences.[4]

[2]See, for example, Fearon & Latin (2003), Fearon (2004, 2005), Collier and Hoefller (2004), Montalvo & Reynal-Querol (2005), Collier et al. (2009), Estenban et al.(2011).

[2]There is a substantial theoretical literature on conflict in general: see, for sample, Brito and Intriligator (1985), Skaperdas (1992), Hirshleifer (1995), Grossman and Kim (1996), Neary (1997), Skaperdas and Syropoulos (2001, 2002), and Garfnkel, Skaperdas and Syropoulos (2008), Becsi and Lahiri (2007).

[3] Different types of resources like oil, diamond, gemstone, timber, and drugs, fueled civil wars in different countries like Nigeria, Angola, Cambodia, Colombia, Sudan, Sierra Lion, Liberia, Ivory Coast, the Republic of Congo, Afghanistan, Myanmar, Cambodia, Peru, the Democratic Republic of Congo (Le Billon, 2000; Fearon, 2005; Humphreys, 2005; Janus, 2012).

[4]Lahiri (2010) also analyze the issue of 'blood diamond', but in a single-period, trade-theoretic framework.

Janus (2012) develops a two-period, three-sector model with endogenous resource extraction, which is more appropriate to analyze conflict between social/tribal groups. There are however conflicts which are led by competing warlords (see Reno, 1998 & 2002).[5]

In our model, in the first period two warlords extract existing resources and fight with each other to capture more resources. If a warlord wins the war, she gets the remaining resource stock in the second period. Each warlord hires labor from the same competitive labor market for two purposes: extraction of resources and fighting. Each warlord also uses the resource revenue to finance the costs of extraction and costs of war. There is a numeraire good sector, directly unrelated to the conflict, which also uses labor from the competitive market with endogenous wage rate. This endogeneity of the wage rate is another departure of the present model from the existing literature.

The main purpose of this paper is to examine the policy options for the international community to resolve civil conflicts related to natural resources. One policy that we consider is sanctions on the export of the natural resource.[6] Our results suggest that the nature of the sanction is very important for the outcome: while a temporary current sanction is always counter-productive, a credible threat of future sanctions unambiguously reduces the conflict. We also consider the effects of a bilateral piecemeal reduction in war efforts, and find that such a peace process improves the welfare of the warlords. Thus, the international community may need to focus on educating the warlords on the benefits of peace. A third policy option to limit the conflict is productivity improvement in the numeraire-good sector (or, the rest of the economy). This will reduce the conflict if the initial stock of the resource is large.

The rest of the paper is organized as follows. Section 2 presents the model of natural resource and conflict, and its' solution. Section 3 examines the effects of policy changes. Section 4 considers the effects of piecemeal reduction in war efforts. Section 5 makes some concluding remarks.

2 The Model

There are two risk-neutral warlords who own and control some natural resource. Both warlords fight with each other to capture more resources.[7] Each warlord hires labor from a competitive labor market for two purposes: extraction of resources and fighting for more resource stock. There are two periods. In the first period, the two warlords extract resources and fight with each other. The winner gets remaining resource stock in the second period. Each warlord uses the resource revenue to finance the costs of extraction and the costs of war. The rest of the economy also competes with the two warlords for labor. For convenience, the rest of the economy will be called the agricultural sector.

Warlord *i*, $i = 1, 2$, possesses an initial resource stock y_i, and hires l_{ri} amount of labor for resource extraction and l_{ci} amount of labor for fighting a war. The resource extraction production function is given by:

$$r_i = 2l_{ri}^{1/2}, \; i = 1, 2. \qquad (1)$$

This function implies a diminishing returns to extraction.

Warlord *i*'s winning probability in war is given by the conventional ratio-form contest success function: $q_i = l_{ci}/(l_{ci} + l_{cj})$, $j \neq i$.[8] This function implies that for given amount of conflict labor of warlord *j*, the winning probability of warlord *i* increases with its' conflict labor, and it reduces with the conflict labor of the other warlord.

[5]This framework conforms to the warlord competition in weak African states. There are many examples of warlords in Africa at different times e.g., Idi Amin and Joseph Kony (Uganda), Milton Blahy and Charles Taylor (Liberia), Sani Abacha (Nigeria), Tomas Lubanga (DRC), Jean-Bedal Bokassa (CAF), Bosco Ntaganda (Rwanda).

[6]For example, sanctions have targeted countries experiencing civil war, such as Liberia, Rwanda, Sudan, Lebanon, Cambodia, and Yugoslavia (Escribà-Folch, 2010). Diamond embargo was impose on warring groups of Ivory Coast, Sierra Leone, Liberia, and Angola to end conflicts related to diamond (Wallensteen et al., 2006).

[7]We implicitly assume that the government unable to secure property rights.

[8]Many authors use this type of contest success function. See, for example, Tullock (1980), Hirshleifer (1991), Skaperdas (1996), Becsi and Lahiri (2007), Ploeg & Rohner (2012).

The landlord, who produces agricultural goods, hires l_a amount of labor from the labor market. The agricultural production function is given by:

$$A = 2l_a^{1/2}V^{1/2}, \quad (2)$$

where V is a fixed amount of sector-specific land available to the landlord. The treatment of the rest of the economy (agriculture) is very different here than in Janus (2012), who models conflict based on social/tribal lines. There the rest of the economy is also parceled into two parts, each warring group owning one part. Labor is also specific to each group in Janus (2012). Here the two groups compete for labor from the same pool.

The net total expected return of warlord i is given by:[9]

$$\begin{aligned} R_i &= p_1 r_i - (wl_{ri} + wl_{ci}) + q_i p_2 (y_i + y_j - r_i - r_j) \\ &= p_1 (2l_{ri}^{1/2}) - (wl_{ri} + wl_{ci}) + \frac{l_{ci}}{l_{ci} + l_{cj}} p_2 (y_i + y_j - 2l_{ri}^{1/2} - 2l_{rj}^{1/2}), i = 1,2; j \neq i, \end{aligned} \quad (3)$$

where p_1 is the current international market price of resource, w is the wage rate, and $p_1 r_i - (wl_{ri} + wl_{ci})$ is the net revenue in period 1. The expected world market price of resources in period 2 is p_2, and $(y_i + y_j - r_i - r_j)$ is the resource stock that warlord i get at the beginning of the 2nd period if it wins the conflict.

The warlord i maximizes expected return with respect to l_{ri} and l_{ci}, subject to the budget constraint. Since we assume that net resource revenues in period 1 are used to finance the costs of war, the budget constraint for each warlord can be written as: $p_1 r_i \geq (wl_{ri} + wl_{ci})$, i = 1, 2. We shall consider this constraint to be non-binding so that the warlord will have some surplus. The first-order conditions for warlord i (i = 1, 2) are given by:

$$p_1 l_{ri}^{-1/2} = w + \frac{l_{ci}}{l_{ci} + l_{cj}} p_2 l_{ri}^{-1/2}, \quad (4)$$

$$\frac{l_{cj}}{(l_{ci} + l_{cj})^2} p_2 (y_i + y_j - 2l_{ri}^{1/2} - 2l_{rj}^{1/2}) = w. \quad (5)$$

Equation (4) says that the marginal benefit of using labor for extraction (the left hand side) must equal the marginal cost of it (the right hand side). Marginal benefit of extraction equals the value of marginal product of extraction labor, while marginal cost equals wage cost of labor plus the opportunity cost of extracting now instead of conserving it for the future. This opportunity cost is equal to the value of marginal product of extraction labor in period 2 multiplied by the probability of winning the conflict. Equation (5) equates the marginal benefit of labor in conflict — which is the change in the likelihood of winning times the prize of winning the conflict — to the marginal cost of labor in conflict.

Labors move freely between sectors and, as a result, wage rate is same throughout the economy. The landlord also maximizes profit given by:

$$R_a = p_a (2l_a^{1/2}V^{1/2}) - wl_a, \quad (6)$$

where p_a is the price of agricultural goods. The first-order condition for the landlord is:

$$p_a l_a^{1/2} V^{1/2} = w. \quad (7)$$

Equation (7) states that the marginal benefit of agricultural labor (the value of marginal product of labor) must be equal to marginal cost of labor.

The economy has a fixed supply of labor, denoted by L. The demand for labor comes from three sectors: resource extraction, conflict, and agricultural sector. Thus, the labor market equilibrium condition is given by:

$$l_{r1} + l_{r2} + l_{c1} + l_{c2} + l_a = L. \quad (8)$$

[9]Without loss of generality, we assume the discount rate to be zero.

We assume that the economy is small open one so that p_a, p_1 and p_2 are exogenously given. This completes the description of the model which has twelve equations in (1)-(8) and twelve endogenous variables in r_1, r_2, A, R_1, R_2, R_a, l_{r1}, l_{r2}, l_{c1}, l_{c2}, l_a and *w*.

For the sake of simplicity and ease of analysis, we assume that the two warlords are *symmetric* (i.e., $y_1 = y_2$). With this assumption, we can solve the key variables in terms of *w* and the parameters as:

$$r = \frac{2p_1 - p_2}{w}, \quad l_r = \left(\frac{2p_1 - p_2}{2w}\right)^2 > 0, \quad l_c = \frac{p_2[wy - (2p_1 - p_2)]}{2w^2}, \quad l_a = \frac{{p_a}^2 V}{w^2} > 0. \tag{9}$$

Note that $r > 0$ if and only if $2p_1 - p_2 > 0$, as assumption that we shall henceforth make. Also, $l_c > 0$ if and only if $y > (2p_1 - p_2)/w = r$.

Finally, the wage rate is determined after substituting (9) in the labor market equilibrium condition:

$$2l_r + 2l_c + l_a = L. \tag{10}$$

3 Policy Analysis

One frequently applied international policy instrument to reduce a civil conflict is imposing sanctions on resource exports from the conflict zone (known as the blood diamond policy). For example, in 1992, the UN Security Council proposed a ban on timber shipped from Cambodia to Thailand to limit the funding of rebel group Khmer Rouge who was controlling the forests near the border of Thailand (Janus, 2012). The UN Security Council also took measures against the rebel forces in Liberia, the Democratic Republic of Congo, Sierra Leone, and Angola (Ross, 2004). The most prominent example of blood diamond policy is the Kimberly Process Certification Scheme (which took effect in 2003) that targets the trade in rough diamond, based on the premise that diamond had fueled civil war in different parts of the world, especially in Africa.

In this paper, we examine how sanctions on resource exports affect conflicts. A sanction on resource exports reduces the export price received by the sanctioned party. Thus, we will examine how war efforts of the warring groups change with reductions in resource prices. We consider two different types of sanction: temporary sanction (sanction on period 1 only, $dp_1 < 0$), and sanction threat or expected future sanction (sanction on period 2 only, $dp_2 < 0$). We also examine how war efforts change with the change in agricultural price or productivity.

In order to see the contribution an induced change in the wage rate has on conflicts, we shall, to start with consider the case where *w* is exogenous. We call this case the case of unemployment, i.e., equation (10) does not hold.

3.1 Unemployment

Differentiating (9), we find:

$$\frac{\partial l_r}{\partial p_1} = \frac{r}{w} > 0, \quad \frac{\partial l_r}{\partial p_2} = -\frac{r}{2w} < 0,$$

$$\frac{\partial l_c}{\partial p_1} = -\frac{p_2}{w^2} < 0, \quad \frac{\partial l_c}{\partial p_2} = \frac{wy + 2(p_2 - p_1)}{w^2} = \frac{2w^2 l_c + {p_2}^2}{2p_2 w^2} > 0, \tag{11}$$

giving us the following proposition.

Proposition 1. *When there is unemployment in the economy so that wage rate is fixed, we have: (a) a temporary sanction increases conflict, and (b) a threat of future sanctions reduces conflict.*

A fall in the resource price due to sanction in the current period leads to hiring of less labor for extraction. This is because a fall in resource price reduces the marginal benefit of extraction labor. However, less extraction in period 1 increases the future prize of conflict, which causes an increase in conflict labor. In contrast, a fall in the future price of resource reduces the value of future prize of conflict.

It also reduces the opportunity cost of extraction in the current period, which increases extraction and therefore reduces future prize of conflict. Thus, both effects of future sanctions reduce conflict.

3.2 Full Employment

Having considered the benchmark case, we now consider the effect of sanctions when the wage rate is endogenous. Substituting (9) into (10), we get (see appendix A.1):

$$2p_2wy - 2w^2L + 4p_1^{\,2} + 3p_2^{\,2} - 8p_1p_2 + 2p_a^{\,2}V = 0 \quad , (12)$$

which determines equilibrium wage rate as a function of exogenous variables.

Totally differentiating (12), we find:

$$\frac{dw}{dp_1} = -\frac{4w(p_1 - p_2)}{\Delta} \quad , \quad \frac{dw}{dp_2} = -\frac{w(wy + 3p_2 - 4p_1)}{\Delta} \quad , \quad \frac{dw}{dp_a} = -\frac{2wp_aV}{\Delta} > 0 \quad , \quad (13)$$

where $\Delta = (2p_1 - p_2)(3p_2 - 2p_1) - p_2wy - 2p_a^{\,2}V < 0$ for the Walrasian stability of labor market equilibrium.

Note, $dw/dp_1 > 0$ if and only if $p_1 > p_2$, and $dw/dp_2 > 0$ if and only if $wy + 3p_1 - 4p_2 > 0$, a sufficient condition for which is $y > 2r$.

An increase in current price increases extraction labor, but reduces conflict labor. If the current and expected future prices are same, the two effects will cancel each other out, leaving the wage rate unaffected. If current price is higher (lower) than expected future prices, the first (second) effect will dominate, demand for labor will increase (decrease) raising (lowering) the equilibrium level of the wage rate. An increase in agricultural price/productivity increases wage rate by increasing the demand for agricultural labor.

Totally differentiating (9) and using (9) and (13), we find (see detail derivation in appendix A.2):

$$\frac{dl_r}{dp_1} = \frac{\partial l_r}{\partial p_1} + \frac{\partial l_r}{\partial w}\cdot\frac{dw}{dp_1} = -\frac{r[2p_a^{\,2}V + 2l_cw^2]}{w\Delta} > 0 \quad (14)$$

$$\frac{dl_c}{dp_1} = \frac{\partial l_c}{\partial p_1} + \frac{\partial l_c}{\partial w}\cdot\frac{dw}{dp_1} = \frac{2p_2p_a^{\,2}V/w + 2rl_cw^2}{w\Delta} < 0 \quad , \quad (15)$$

$$\frac{dl_r}{dp_2} = \frac{\partial l_r}{\partial p_2} + \frac{\partial l_r}{\partial w}\cdot\frac{dw}{dp_2} = \frac{r[p_a^{\,2}V + 2p_1l_cw^2/p_2]}{w\Delta} < 0 \quad , \quad (16)$$

$$\frac{dl_c}{dp_2} = \frac{\partial l_c}{\partial p_2} + \frac{\partial l_c}{\partial w}\cdot\frac{dw}{dp_2} = -\frac{p_a^{\,2}V[p_2 + 2l_cw^2/p_2]/w + 2p_1rl_cw^2/p_2}{w\Delta} < 0 \quad . \quad (17)$$

From the above equations, the following proposition follows.

Proposition 2. *When the wage rate is endogenous, we have:(a) a temporary sanction increases conflict, and (b) the threat of a future sanction reduces conflict.*

That is, the endogeneity of the wage rate reinforces the results in proposition 1. A change in resource price affects demands for extraction labor and conflict labor both directly and indirectly. A change in the resource price in period 1 has ambiguous effect on the wage rate (see (13)) and the change of which causes an indirect effect on conflict. A decrease in the current resource price reduces extraction directly, increasing the expected future gain from the conflict. That is a decrease in resource price increases the conflict directly. This direct effect is dominant even if indirect effect reduces the conflict, and a current sanction thus unambiguously increases conflict. An expected decrease in future price has opposite effects on extraction and conflict compare to current price effect. Once again the effect via the wage rate is ambiguous, but the direct conflict-reducing effect always dominate the indirect effect.

We shall conclude this section by analyzing the effect of an increase in p_a which is equivalent to an increase in productivity in the agricultural sector, on conflict.

Differentiating optimal values of l_r and l_c with respect to p_a, we get (see appendix A.3):

$$\frac{dl_r}{dp_a} = \frac{\partial l_r}{\partial p_a} + \frac{\partial l_r}{\partial w}.\frac{dw}{dp_a} = \frac{p_a V(2p_1 - p_2)^2}{w^2 \Delta} = \frac{p_a V r^2}{\Delta} < 0 \quad , \tag{18}$$

$$\frac{dl_c}{dp_a} = \frac{\partial l_c}{\partial p_a} + \frac{\partial l_c}{\partial w}.\frac{dw}{dp_a} = -\frac{p_a p_2 V[2(2p_1 - p_2) - wy]}{w^2 \Delta} \quad . \tag{19}$$

From (19), we find that $dl_c / dp_a < 0$ if and only if $y > 2(2p_1 - p_2)/w = 2r$, i.e., if and only of the initial stock of the resource is sufficiently large. Formally,

Proposition 3. *An increase in productivity in the rest of the economy will reduce conflict when the initial stock of the resource is sufficiently high.*

From (19), it is clear that an increase in p_a has no direct effect on l_c. However, such an increase raises demand for labor in the agricultural sector and thus the equilibrium value of the wage rate *w* (see (13)). This increase in the value of *w* has two effects on the level of conflict. First, it increases the marginal cost of war (see (5)) and thus reduces the value of l_c. But, the increase in *w* also increases the marginal cost of extraction (see (4)). This reduces the level of extraction, increasing the amount of future gain from war and thus the marginal benefit of war. The first effect dominates the second if the initial stock of the resource is sufficiently large. This result is different from Janus (2012) where increased in agricultural productivity increases conflict.

4 Piecemeal Reduction in War Efforts

In this section, we shall examine the effect of a bilateral piece-meal reductions of war efforts, starting from war equilibrium. For this, we shall not assume that the two groups are symmetric. However, it is to be noted from (4) and (5) that the equilibrium satisfies $l_{r1} = l_{r2}$ and $l_{c1} = l_{c2}$. This is because, both warlords face the same wage rate and, in the case of a win, both groups get the same reward. However, for simplicity we shall assume that $p_1 = p_2$, and given that the war efforts are the same for the two groups, we consider the changes in the war efforts by the two warlords to be the same, i.e., $dl_{c1} = dl_{c2}$.

We start with the benchmark case where the wage rate is exogenous. Differentiating (3), and using (4) and (5) (envelope property), we get:

$$dR_1 = -\frac{l_{c1}}{(l_{c1} + l_{c2})^2} p_2 (y_i + y_j - 2{l_{r1}}^{1/2} - 2{l_{r2}}^{1/2}) dl_{c2} = -w dl_{c2} \quad , \tag{20}$$

$$dR_2 = -\frac{l_{c2}}{(l_{c1} + l_{c2})^2} p_2 (y_i + y_j - 2{l_{r1}}^{1/2} - 2{l_{r2}}^{1/2}) dl_{c1} = -w dl_{c1} \quad . \tag{21}$$

That is, both warlords benefit unambiguously by reducing war efforts mutually. In this case, the gain of each warlord comes from a decrease in wining probability of the other warlord due to a reduction of conflict labor by that warlord.

We now turn to the case where the wage rate is endogenous. In this case, differentiating (3) and using (4), (5) and (9), we get:

$$dR_1 = -\frac{l_{c1}}{l_{c1} + l_{c2}} p_2 {l_{r2}}^{-1/2} dl_{r2} - w dl_{c2} - (l_{r1} + l_{c1}) dw = (l_{r1} - l_{c1}) dw - w dl_{c2}$$

$$dR_2 = -\frac{l_{c2}}{l_{c1} + l_{c2}} p_2 {l_{r1}}^{-1/2} dl_{r1} - w dl_{c1} - (l_{r2} + l_{c2}) dw = (l_{r2} - l_{c2}) dw - w dl_{c1} \quad . \tag{23}$$

From labor market equilibrium condition, we derive:

$$dw = \left(\frac{w}{2l_{ri} + l_a} \right) dl_{ci}$$

, $i = 1, 2$.

Substituting the above into (22) and (23), we obtain:

$$dR_1 = -(\beta w) dl_{c2} > 0, \quad dR_1 = -(\beta w) dl_{c2} > 0, \tag{24}$$

where $\beta = (l_{r1} + l_{c1} + l_a)/(2l_{r1} + l_a) > 0$.

Once again, both landlords benefit unambiguously from the agreement. Formally,

Proposition 4. *Starting from the initial Nash equilibrium, if both warlords agree to reduce war efforts by the equal amount, both of them benefit unambiguously.*

When wage rate is endogenous, a bilateral reduction in war efforts changes the expected revenue of each warlord in different ways. First, a reduction in conflict labor by one warlord (*j*) decreases the probability of wining of that warlord, and thus increases the expected revenue of the other warlord (*i*) by the amount wdl_{cj}. Second, a decrease in wage rate due to a decrease in conflict labors reduces the costs of extraction and of conflict (by $(l_{ri} + l_{ci})dw$), and thus increases the revenues even further. However, the increase in extraction (due to the decreases in the wage rate) by the other group decreases the expected future revenue by the amount $2l_{rj}dw$. But the positive effects on the revenue dominate the negative one.

One approach of rebellion is the rebellion-as-mistake approach (Collier et al., 2004). Each group overestimates the prospects of victory and thus puts 'too much' war efforts. If international community negotiates with the rival groups and can convince them that both groups will benefit from bilateral reductions in war efforts, war intensity will go down. Regan and Aydin (2006) have shown empirically that diplomatic efforts in the past have been successful in reducing war durations.

5 Conclusion

Most of the empirical studies on civil conflicts find that the countries that are dependent on natural resources also tend to have large incidence of poverty, large ethnic fractionalization, large population, a high proportion of mountainous terrain or jungles, and weak institutions for conflict resolution, and thus they tend to experience more civil conflicts (see, for example, Fearon and Lation, 2003; Collier and Hoeffler, 2004; Fearon, 2005; Blattman and Miguel, 2010). There are no short run solutions to these structural causes of civil war. However, international community can target the immediate causes of conflict by reducing the rewards of conflict or by raising peace dividends. Our paper provides some insights about the potentials of international policy interventions for conflict resolution.

The main purpose of this paper is to examine the policy options for international community to resolve civil conflicts related to natural resources. We develop a model of non-ethnic civil conflict where two warlords fight with each other to capture resources. In our model resource extraction is endogenous during the conflict. The rest of the economy is not directly involved in the conflict, and all parties – the warlords and the rest of the economy — compete for labor from the same pool, making wage rate endogenous.

Our findings have important policy implications for conflict resolution. One of the most popular policies for conflict resolution is to impose sanctions on exports of natural resources from conflict zone, known as the 'blood diamond' policy. Our results suggest that a temporary current sanction is always counter-productive. However, a credible sanction threat that decreases the future prize of conflict unambiguously reduces conflict. Second, a policy option is to raise the productivity in the rest of the economy. We show that this policy option is effective when the initial level of resource stock is sufficiently large. Finally, our results also suggest that the most effective policy for conflict resolution would be bilateral piecemeal reduction in war efforts. Thus, if international community can negotiate with the warring groups and can convince them that both will benefit from bilateral reductions in war efforts, then conflict may be resolved. This result supports the conventional wisdom that diplomatic solution is the best way to resolve any conflict.

We conclude by noting that our findings may not be applicable to all types of civil conflicts. Our analysis specifically applies to non-ethnic conflicts spearheaded by warlords and to situations where resources extraction is endogenous.

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