From Predation to Production Post-conflict

Satish Chand

Abstract

This paper builds an analytical framework that models predation (banditry) and production as part of the choice of a rational utility-maximising agent. Aggregating this choice up for society produces equilibrium outcomes ranging from Utopia (where no one predates) to Amorphy (where everyone does). The intermediate position constitutes Anarchy where a mix of predation and production prevail. This framework shows that (i) organized conflict can lower welfare relative to the level that prevails without such organization; and, (ii) peacekeeping raises welfare, but the equilibrium is self-enforcing only with the requisite level of peacekeeping technology. The last is then used to analyse conditions under which peacekeeping arises endogenously and the potential (and catalytic) role for external assistance in the above.

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Foreword

I am pleased to sponsor this working paper by Satish Chand, a visiting fellow at CGD and research professor at the University of New South Wales. The paper is part of CGD's ongoing work on weak and fragile states, which is focused on improving the effectiveness of foreign aid in post-conflict interventions. Chand's research question is highly relevant as international actors continue to struggle with appropriate and effective intervention strategies. The theoretical model in the paper makes a valuable contribution and sets the stage for answering important empirical questions. Chand examines the challenge of shifting government behavior from predation to production via externally sponsored peacekeeping interventions in fragile or post-conflict states. Chand shows that the tendency to either predate or produce is a choice of rational utility-maximising agents, and that external intervention can shift the equilibrium from one dominated by predation (characteristic of a post-conflict scenario) to one motivated by production. The challenge for international peacekeepers is therefore in the creation of conditions that reduce predation to the point where excess output from production raises incomes above their predatory levels.

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1.   **Introduction**

Fragile and failing states are home to a disproportionately large share of the world's poor. Of the 45 countries that the World Bank lists as being in this category, 34 belong to the International Development Association (IDA) – the part of the Bank that deals with the poorest nations. As a group, these nations account for 19 percent of the population of IDA-eligible nations, but account over a third of their 'extreme poor'. [1] There is consensus within the literature that conflict causes poverty and human suffering, the effects of which spill across both space (including across national borders) and time. On the former point, Chauvet, Collier, and Hoeffler (2007) estimate that states with internal conflict shave 0.6 percentage points off the GDP growth rate of their neighbors, while on the latter point, Ghobarah *et al* (2003) show that the effect of civil war on poverty and suffering in the afflicted population lingers long after the cessation of active warfare. In the words of Robert Zoellick, President of the World Bank, fragile states constitute "the toughest development challenge of our era" (see footnote #1).

The lessons on how best to assist countries coming out of conflict and prevent those on the verge from sliding into warfare have been drawn largely from cross-country studies, the majority of which have analyzed the partial correlates of conflict in terms of onset and duration with a handful of explanatory variables. The findings of relevance to this paper include: (i) post-conflict countries have a risk of relapse with historical data showing that some 40 percent fell back into conflict within ten years of civil war (Walter, 2004); (ii), the cost of conflicts are large and spill across to neighbors (Collier et al, 2003); and (iii), economic development reduces the risk of

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[1] See
http://web.worldbank.org/WBSITE/EXTERNAL/EXTABOUTUS/IDA/0,,print:Y~isCURL:Y~content
MDK:21389950~pagePK:51236175~piPK:437394~theSitePK:73154,00.html

the onset of civil war (Elbadawi and Sambanis, 2002) while deprivation from economic and political participation can catalyze one (Walter, 2004). An implication of the above is that improvements in economic opportunities and political participation can reduce the likelihood of onset and conflict recidivism.

Lacking in the post-conflict literature is a unified conceptual framework that maps out the possible states of fragility, from conflict to permanent peace, and a welfare ordering of the possible equilibrium outcomes. This paper fills this void by providing a rudimentary model that captures the continuum from Utopia where no one predates, to Amorphy where everyone does.[2] In between these extremes, a mix of predation and production takes place with the particular balance determined by the sum-total of the choices made by individuals in the community.

The model presented here has Utopia, Amorphy, and Anarchy as three separate equilibriums. The theoretical framework, moreover, encompasses the full spectrum of possible outcomes from a situation of a full-blown civil conflict where production has collapsed to subsistence (with this equilibrium labelled as 'Amorphy'), to a situation where all of the community's resources are devoted to producing output only (the ensuing equilibrium labelled as 'Utopia'). Consequently, per capita consumption in Amorphy is at a minimum, while in Utopia it is at the maximum. The various combinations of 'appropriation or predation' and 'resource defense and production' in-between these extremes constitute 'Anarchy'. The particular equilibrium that

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[2] The terminology used in this paper is from Hirshleifer (1995). Amorphy and Subsistence are used interchangeably.

prevails, moreover, is determined by the choices made by individual economic agents. This, in turn, is determined by the incentives for the two activities.[3]

Having modelled the various stages from fragility to conflict, we then explore the possibilities for peacekeeping to arise endogenously in the Amorphic (conflict) equilibrium. Finally, we investigate the role of external assistance in inducing a shift to such an outcome. The approach in this paper is different from that of existing studies in that it explores the incentives for peace building from the perspective of a rational individual. In drawing lessons for policy, we examine the possibility of inducing a shift from an equilibrium characterized by predation domination in conflict, to one for production post-conflict. It is shown that such a shift can be catalysed through temporary external assistance. In our theoretical construct, successful peacekeeping tips the balance from predation to production for individual agents within the afflicted economy. This new equilibrium, once achieved, is stable in that it leaves post-conflict communities with the incentives and resources to maintain production, thereby making lengthy and sustained foreign peacekeeping efforts redundant following the initial shift.

Conflicts constitute strategic games. The majority of game theory models used in the study of conflicts have relied on zero-sum assumptions. In a two-player situation, for example, the gain to one party is assumed to take place at the expense of the other. This is not necessarily true with respect to civil wars where GDP collapses as the war

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[3] The evolving literature on economics of conflict has devoted considerable effort at characterizing the conditions under which one prevails over the other. Sandler and Hartley (2003) provide a comprehensive collection of papers on this subject.

intensifies and rebounds following the restoration of peace (Chand, 2002).[4] The

rebound in GDP during peace has the potential to act as a back-stop and prevent the

country from slipping back into conflict. Thus, peace founded on economic

prosperity has the potential to be self-enforcing. A rebounding economy may be able

to spare resources to a central agency, such as a strong State, that then provides the

requisite level of peacekeeping, among other public goods. When is such an outcome

most likely to occur? How does one know that such a stage has been reached?

This paper fills the first of the two voids noted above. We model gains in per capita

consumption from post-conflict peace and thus investigate the feedback between the

two. Second, we generate figures on threshold levels of the 'peace dividend' that

induces 'endogenous peacekeeping'. Policy lessons on the role of external assistance

are then drawn. The rest of the paper is structured as follows. Section 2 presents the

conceptual framework. Section 3 provides a discussion of the key findings and the

relevance for post-conflict policy making. Concluding remarks bring the paper to a

close.

### 2.	The conceptual framework

Assume an economy comprising farmers (producers) and bandits (predators) in

conflict and operating under competitive conditions. We build a model for post-

conflict analysis wherein incentives are created through external intervention to shift

the equilibrium from a position of predation dominating production to the converse.

Let this economy have N ($\geq$ 2) identical agents who draw utility from consumption of

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[4] Recorded GDP during the conflict in Solomon Islands fell faster than consumption because a large part of the economy retracted into the subsistence/village sector (Chand, 2002). Consequently, government revenues fell faster than per capita consumption as the conflict deepened.

a single good (food) that is either produced or expropriated (*a la* Hirshleifer, 1995; Grossman, 2002; and, Duffy and Kim, 2005). An agent who enters this economy chooses between being a predator or a producer depending on which of the above 'occupations' provides the highest level of consumption. Being a bandit is considered a fulltime occupation such that this group produces nil output. Farmers, however, divide their fixed amount of time between producing output and defending their produce from banditry. This choice, once again, is made on the basis of an allocation that maximizes their per capita consumption. There are no savings, and therefore no investments, thus the model ignores dynamics.

The core parameters of this model comprise the following three: N denotes the population size; $p \in [0,1]$ denotes the proportion of the population that engages in predation, implying that (1-p)N agents engage in production. Of those engaged in production, time devoted to defending their production from predation is denoted as d $\in [0,1]$; the remaining (1-d) of time is used for production. The potential for destruction of output from predation is ignored to keep the analysis simple. We assume that 'p' and 'd' are chosen under conditions of full information.

Aggregate output (food) produced under the assumptions noted above is given by:
$$Y = N(1 - p)(1 - d) \qquad (1).$$
Equation (1) captures the nexus between peace and its dividend in terms of increased output. Per capita output (and consumption) is given as y = c = (1-p)(1-d). The 'utopian' equilibrium is defined as the case when p=d=0. Per capita output and consumption in Utopia is unity – this henceforth will constitute the baseline for comparison to the other equilibriums. The 'amorphic' equilibrium is characterised by

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p=1, thus output (and consumption) equals zero. The anarchic equilibrium result for values of p and d between 0 and 1.

The apportionment of aggregate output between predators and producers necessitates the introduction of one more variable, Π. Let Π (>0), a ratio, denote the efficiency of the predation (equivalent to the reciprocal of the defense) technology. This variable is assumed to be increasing in 'p' (the proportion of the population that predates) and decreasing in 'd' (the time devoted to defending output). This 'Contest Success Function', considered appropriate given the assumption of full information (Hirshleifer, 1995; 2001), is given by:

$$\Pi = \frac{p}{d} \qquad\qquad (2).$$

The fraction of total output that accrues to predators from (2) is given by:

$$\Psi = \frac{p}{d + p} \qquad\qquad (3);$$

where $\Psi = \Pi/(1+\Pi)$, $\Psi_\Pi > 0$ and $\Psi_{\Pi\Pi} < 0$.[5] Given that Ψ is a monotonic transformation of Π and the symmetrical nature of equations (1) and (2), the solutions to optimal choices of 'd' and 'p' to maximise Ψy will be identical to Πy.

We can now solve for the predators' and producers' problems. Given the assumption of identical agents interacting under conditions of full information, the predators' maximize ΠY by choosing 'p'. Three separate equilibriums are considered next. First, we consider the case of a decentralized competitive equilibrium where each of the predators (producers) act to maximize his or her individual consumption, taking

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[5] Ψ is a normaliser, ensuring that total output is fully divided between predators and producers.

observed values for defense (predation) as given. This is the case of an atomistic

agent working in isolation of the rest of the predators with the ensuing equilibrium

referred to as Anarchy. The second case is that of a coordinated equilibrium where

the predators and producers act collectively to maximize their shares of total output.

The ensuing equilibrium is characterised as Amorphy. Third, we consider the case of

a peacekeeper (G) who maximises per capita output by taking on the role of

defensefrom the producers. This last case is interpreted as that of the emergence of an

'endogenous government'.

Case 1: The Atomistic Anarchy ($N > 2$)

Consider the case of an agent waking up in this economy, faced with the dilemma of

deciding his occupation – being a predator or a producer. The decision rule is to

choose the occupation that maximizes his consumption, taking the level of production

(and thus defense) in the economy as given. This problem is given by:

$$\underset{p}{\max} \Pi y = \frac{p}{d}(1-d)(1-p) \qquad\qquad (4).$$

The solution to (4) is $p^* = \frac{1}{2}$. That is, the agent simply tosses a coin to decide his

occupation as the first move. Landing a 'bandit' requires no more decisions.

Otherwise, the agent chooses the optimal allocation of time between production and

defense. The problem in the latter case is analogous to the earlier problem, thus by

symmetry $d^* = \frac{1}{2}$. These solutions are unaffected by the sequence of the moves. [6]

The values of 'd*' and 'p*' being equal is characteristic of symmetric Nash games

(see Dixit, 1987). What is less clear in this particular case, however, is that this is the

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[6] The proof is trivial and can be shown by setting $p^* = \frac{1}{2}$ in equation 1, and optimising with choice of d.

only interior solution. Note that $\Psi_{dd} < 0$ while $\Psi_{pp} > 0$, thus a sufficient condition for a global maximum for Ψ is:

$$\frac{\partial^2 \Psi}{\partial p \partial d} = \frac{d-p}{(d+p)^3} = 0 \qquad\qquad (5);$$

the solution to which is $d^* = p^*$. Thus per capita consumption for the population of producers and predators in the atomistic-anarchy is ¼ of what is possible in Utopia. But what if the two groups can coordinate among themselves – say due to pre-existing divisions such as a common religion or ethnicity?

Case 2: Coordinated-Amorphy ($N = 2$)

We next consider the case where defense (d) is a function of the level of predation (p); i.e. $d = d(p)$, where 'd' is rising in 'p' and $d(0) = 0$. That is, time devoted to defense in the absence of predation is nil (this being the case of Utopia). This is the case where predators and producers, as a group, are able to resolve their collective-action problem.

Noting the symmetrical nature of the solution to (1), let $d = p$. Thus, equation (1) now becomes:

$$\underset{p}{\max}\Pi Y = (1-p)^2 \qquad\qquad (6).$$

The solution to (6) is $d^* = p^* = 1$. This is a stark result as everyone now predates with output being equal to zero. This equilibrium, given the absence of production, is described as 'Amorphy'. The solution of $p^* = 1$ is due to the choice of functional forms in equations (1) and (2), but the finding that, when collective action problems are resolved, the level of predation is greater than otherwise is robust to the choice of

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alternative functional forms of production and CSF (see Heirshliefer, 1995). Thus, resolving the collective action problem leads to 'excess predation' when compared to the situation in atomistic (unorganized) Anarchy. For the functional forms used here, grouping leads to a 'leap to the bottom'.

Proposition 1: Collective action between predators and producers leads to excess predation, such that the level of per capita consumption is lower than what prevails in Anarchy.

The policy relevance of proposition 1 is that any intervention that induces the grouping of predators and/or producers has the potential to exacerbate predation, thus lower per capita consumption.

Case 3: Endogenous peacekeeping

Case 1 shows that atomistic behaviour leads to less predation, and thus delivers a level of production and consumption greater than what prevails under coordination amongt predators and producers. Here we begin with a post-conflict situation characterized by the Amorphy and consider the conditions under which endogenous peacekeeping arises. The role of external intervention, if any, in this change is also investigated.

The sole purpose of peacekeeping is to lower predation and it is a fulltime occupation. Let $g \in [0,1]$ denote the fraction of N used for peacekeeping. The remaining $(1-g)N$ will now be divided between predation and production. The role of the peacekeeper is to guard against (internal) predation. We now investigate the possibility of peacekeeping arising endogenously in this framework.

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We have two sets of 'non-producers': one of 'bandits' and another of peacekeepers who keep the bandits in check. Consider the economy being in Amorphy (Case 2) with per capita consumption at nil – this situation may be rationalized as the case of subsistence. The peacekeepers, moreover, are rational agents thus take this role only if it raises their consumption. We now search for the level of (formal sector) output that is necessary to induce endogenous peacekeeping.

Equation (1) now is modified to reflect the level of output produced with peacekeeping as:

$$Y = N(1 - p - g)(1 - d) \qquad (7);$$

where the first parenthesis shows the number of producers and the second the time devoted to production by these producers. We need to specify a technology that links peacekeeping to the level of defense provided by the individual producers. Let this technology be given as:

$$d = -\phi \ln g \qquad (8).$$

Equation (8) shows that defense (peacekeeping) technology is subject to diminishing returns and to differing levels of efficiency as captured by ϕ, the peacekeeping-technology parameter. Note that given $d \in [0,1]$, $g \in [0.36^{1/\phi}, 1]$.

The peacekeeper's problem is one of maximizing (7) by choosing 'g'. The solution to the above requires assumptions regarding the equilibrium relationship between p^* and g^*. Two specifications are used next. The first, as for the symmetric cases in 1 and 2, is when $p^* = d^*$ with equation (8) providing the link between d and g. The second case is where we assume $p^* = g^*$; the latter assumption is rationalized as the situation

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where each predator in equilibrium requires a matching peacekeeper to contain predation. In the case of the first (where p*=d*), substituting (8) into (7) and choosing g* to maximise y gives the implicit solution for g* in terms of ϕ as:

$$\frac{1}{g*}[2 + 2\phi \ln g * - g * \ln g*] = \frac{1+\phi}{\phi} \qquad (9).$$

For the specific case of $\phi = 1$, the (numerical) solution to (9) is g* = 0.53 with $y_{g*} = 0$. Per capita consumption in this equilibrium is the same as that in Amorphy. Per capita output, y* (= c*) rises monotonically with a rise in defense technology, however. For example, g* = 0.18 for $\phi = 0.1$ when c* = y* = $y_{g*=0.18}$ = 0.54. An implication of the above is that internally-generated peacekeeping is feasible only with sufficiently superior technology.

Now, consider the second case where p* = g* – this condition reflects the need for 'boots on the ground' peace enforcement. Substituting (8) into (7) and solving for g* (= p*) gives the implicit solution for g* as:

$$\frac{1}{g*} - 2\ln g* = \frac{2}{\phi} + 2 \qquad (10).$$

The solution for $\phi = 1$, the level of technology assumed for the baseline case, of equation (10) is g* = 0.43.[7] Substituting this back into (8) gives d* = 0.16; and substituting the values into (7) gives y* = 0.12. In this case, peacekeeping raises per capita consumption from the level in Amorphy, but this is well below the level that prevails in atomistic Anarchy. That is, for the given parameters, Anarchy is efficient.

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[7] That is, y = (1-2g)(1 – ln[1/g]). The necessary and sufficient condition for a maximum is 1/g - 2lng = 4. This is solved numerically with figures rounded to two decimal places.

Both of these cases demonstrate that ϕ is a critical parameter in determining the welfare effects of peacekeeping, but in the 'boots on the ground' version the relationship between ϕ and y* is not monotonic.

Next we consider the 'boots on the ground' case of p* = g* and the requisite level of peacekeeping technology to make peacekeeping sustainable. Figure 1 shows values of g* and y* for a range of values for ϕ, the peacekeeping-technology parameter. The blue upward-sloping line shows that the proportion of workers in peacekeeping rises with a fall in defense-efficiency, as reflected by a rise in ϕ. This has two effects: (i) it draws workers out of production into peacekeeping –which has a negative effect on output; and, (ii) it lowers time for defense (refer to equation 8) – which has a positive effect on output. The net effect on output is ambiguous since it is the sum of the above two opposing effects.

For the functional forms employed here, per capita output is a maximum at ϕ* = 0.25. Incremental output is negative for values of ϕ greater that 0.25. Values of $0.1 < \phi < 0.55$ deliver per capita output under peacekeeping that is greater than in Anarchy (where y* = 0.25). Peacekeeping, therefore, raises per capita output compared to the level in Anarchy only for a specific range of ϕ. This effect can be shown algebraically. Solving for the elasticity of time devoted to defense (d) with respect to peacekeeping efforts (g) from equation (8) is given as

$$\frac{\Delta d / d}{\Delta g / g} = -\frac{\phi}{g} \qquad (11);$$

where g* for a given ϕ maximises (11). Per capita consumption is a maximum of 0.31

for $\phi^* = 0.25$ and with $g^{**} = 0.16$.

The two separate assumptions made regarding the relationship among p*, d* and g*

are both plausible. Peacekeeping efforts are likely to impinge on the level of

predation, and thus the level of individual effort expended on defense. This was the

first assumed link where p* was set equal to d*. But the 'boots on the ground'

assumption where g* = p* is equally plausible, particularly when the visibility of

peacekeepers is critical to the level of predation. Reality is likely to be a combination

of the two proposed links between g* on one hand and p* and d* on the other.

Nonetheless, the key result is that peacekeeping technology has a direct impact on the

level of production and thus welfare under peacekeeping compared to an alternative

of either Amorphy or Anarchy.

Figure 1: Per capita output (y*) and peacekeepers as a fraction of the population (g*)
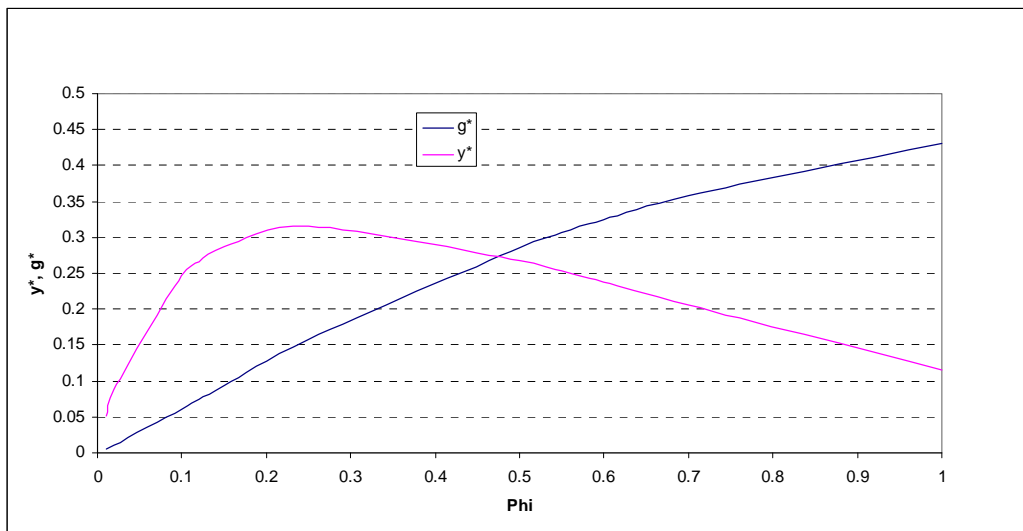
Proposition 2: An equilibrium under peacekeeping yields higher welfare compared to one under Amorphy, but this is not necessarily the case under Anarchy. The latter is true only for a specific range of the efficiency of peacekeeping technology.

The above proposition provides a specific role for peacekeeping. External support for peacekeeping in our model has two specific functions. First, it could lend 'gN', the requisite level of manpower ('boots on the ground') to provide a level of defense, which in turn induces production and consumption that are higher than the status quo. Importantly, the 'peace-dividend', in equilibrium, would be sufficient to compensate for the peacekeeping. Second, external intervention could provide defense technology to make equilibrium under 'G' preferable to the status quo. Anarchy, for example could have been efficient with existing defense technology, but not so with the superior imported technology. Furthermore, the need for external assistance is temporary. The population 'gN' of peacekeepers could be lent from abroad while forces from within the population are recruited.[8] Thus, while 'gN' may be fixed, the composition of locals versus externals could change with a view to having only local peacekeepers at 'G'. Similarly, acquisition of the technology would be a one-off capital outlay – something that could be provided as part of 'aid' absent perfect capital markets. Finally, the rebound in production provides the resources to fund peacekeeping on a sustainable basis.

A number of caveats are in order here. The assumption of identical agents in this model precludes a discussion on how the population divides itself up into the three groups. The incentives for groupings in otherwise homogenous populations are

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[8] An 'Afghan Public Protection Programme (AP3)' whose role is solely defense and not law enforcement is being experimented with (see *Economist* Magazine, 11-17 April 2009; pages 26-7). 'Sons of Iraq' is another similar initiative.

strong given the benefits of the above and the penalties of exclusion (Usher, 1981).

Ethnic, religious, and regional differences may provide the instrument for such

groupings. Spatially confined distribution of natural resources may also serve as an

instrument for divisions in the population. Further, the dynamics of a shift from

Amorphy to Anarchy has not been modelled, and thus no insights are provided on

how shifts could be induced between the two. Several other questions remain, but

these will overburden a simple model.

3.   Discussion and applications

The analytical framework used above is simple, and thus abstracts from many of the

realities of externally-sponsored peacekeeping missions in post-conflict communities.

This has its virtues, but also limitations, both of which need to be factored into the

discussion that follows. The model captures many of the salient features of internal

conflict and the challenges of endogenous (internally-generated) peacekeeping. The

three equilibriums, namely Utopia (U), Anarchy (A), and Amorphy (M) are shown

pictorially in figure 2 below. The horizontal axis shows the proportion of 'non-

producers' in the population, $p+g$. The vertical axis shows per capita consumption.

The UAM schedule is the case without peacekeepers; that is, where $g = 0$. Per capita

consumption is unity in Utopia and zero in Amorphy.

Figure 2: Equilibriums showing Utopia, Anarchy, and Amorphy
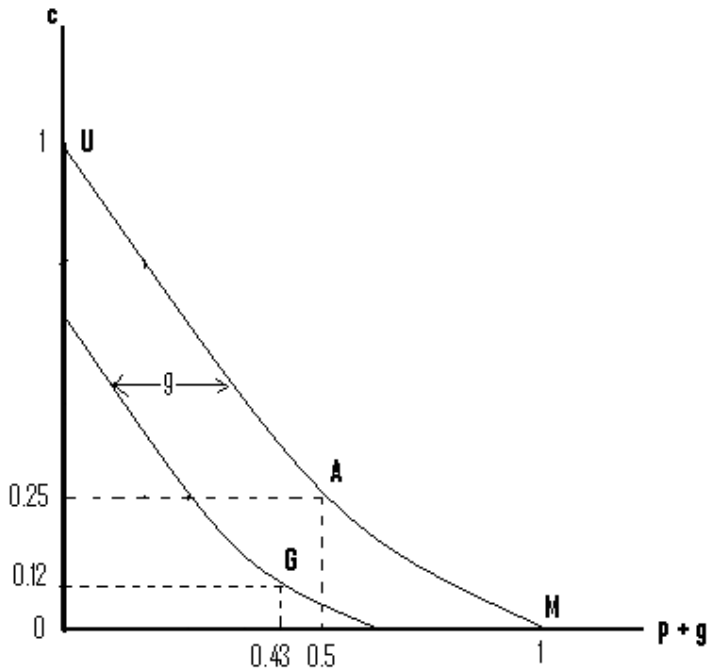
Equilibrium labelled 'A' denotes Anarchy where half the population predates. Of the

half that produces, they spend half their time defending their output, thus per capita

output and consumption for the population as a whole equals 0.25 of what is possible

in Utopia (U). Equilibrium labelled 'M' denotes Amorphy in which the whole

population is engaged in predation. This equilibrium may be thought of as similar to

subsistence and where formal sector economic activity is driven to zero.

Equilibrium 'G' denotes the presence of government where peacekeeping is provided

as the sole public good. In the case where the number of peacekeepers (g^*) had to be

the same as predators (p^*) in equilibrium, and for $\phi = 1$, endogenous peacekeeping

takes place at 'G' with $g^* = p^* = 0.43$. Per capita output at 'G' equals 12 percent of

the level that prevails in 'U'. This is above the level in 'M', but less than that under

'A'. Thus, when $\phi = 1$ peacekeeping may arise endogenously from 'M', but 'A' is

efficient with the existing level of defense technology. This result may explain conditions under which peacekeeping arises endogenously – say following conflict, and after a slippage from 'A' to 'M'. Access to superior defense technology (that is, ϕ < 1 as shown in figure 1) raises per capita consumption and could induce endogenous peacekeeping. Such technology could be lent from outside, providing a role for external assistance.

The model says nothing about how the income is distributed between the three groups: peacekeepers, predators, and producers. At equilibrium labelled 'G', a rational utility-maximizing proprietary (and predatory) state could extract all of the rents generated from peacekeeping. This is what a Leviathan would do. Even a Leviathan, by offering services so as to deter predation, provides welfare above what would prevail in Amorphy.

Peacekeeping in this model acts as the safeguard against a rollback into Amorphy. The role of externally-sponsored peacekeeping may simply be to provide a space for the emergence of an endogenous peacekeeper/state. In terms of the equilibriums shown in figure 2, the state could be either Hobbsian or Leviathanian. In the case of the latter, the proprietary and predatory state will extract all rent that is generated from peacekeeping. Modern peacekeeping operations are more ambitious, however. They aim to create democracies rather than revive autocracies. Per capita consumption is higher under conditions of democracy when compared to that under an autocracy (predatory state) (Olson, 1993). The model used here does not have an equilibrium characterized as a democracy, however. Such equilibrium, if it exists, would rest in between 'U' and 'A'.

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The model used here is static, thus no inferences can be drawn on the dynamics in terms of the shift from one to the other. History, however, tells us that 'U' is unrealistic. Anarchy with decentralized production, as shown by history, is possible, but rare.[9] This may be so due to the high risks of Anarchy breaking down into Amorphy (or an Autocracy), with the shift between the two determined by the costs and benefits of collective-action (Hirshleifer, 1995). It is quite possible that multiple versions of anarchy co-exist, but at different levels of society, and that this division takes place based on considerations of economic efficiency (Leeson, 2006).

4.   Conclusions

We presented a simple framework to elucidate the challenges of inducing sustained peace through external support in post-conflict communities. Such interventions have increased greatly since the World War II. They have also devoured a substantial amount of resources ((UN, 2009). While the effectiveness of many of these missions remains to be rigorously assessed, some have been deemed successful (Glassmyer and Sambanis, 2008). Some have curbed warfare, but some 40 percent of the conflicts have reignited following the departure of the peacekeepers (Walter, 2004). A major challenge in externally-sponsored peacekeeping operations is one of catalysing a process that leads to sustained peace. Can external and temporary peacekeeping operations create such conditions; and if so, then what are they?

This paper presented a simple model that encompasses a spectrum of equilibriums from Utopia (where no one predates) to Amorphy (where everyone does). The latter

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[9] Hunter-gatherer societies exist but are increasingly rare in modern times (Baker, 2003).

equilibrium is then used to approximate a community post-conflict. Lessons are drawn on how best to induce peacekeeping from within the conflict-afflicted community and the role of external assistance. We assumed rational utility-maximizing agents who choose between predation and production. A post-conflict scenario is characterised by a situation where, from the society's point of view, predation dominates production. Such a situation may constitute anarchy, where some output is produced, but a large fraction of resources is devoted to defending production from predation. It could also entail organized conflict where production, and thus consumption, is lower than what would prevail without such organization. Organized conflict, thus, brings about 'excess-predation'. The policy challenge post-conflict is in the creation of conditions for reduced predation to the extent that the excess output generated is sufficient to raise income for all agents compared to what would have prevailed otherwise. This is shown to be possible when the requisite capital is injected from abroad.

Externally-sponsored peacekeeping post-conflict has a catalytic role. This, in our model, includes lending of a more efficient peacekeeping technology and/or peacekeeping personnel. The need for such assistance expires when the host economy has grown sufficiently to be able to provide public goods (peacekeeping) from internally-generated production. This may include the creation of institutions that allow for the resolution of domestic conflicts without resort to violence. Thus, international peacekeeping interventions in post-conflict societies may have a role in providing the space for prosperity to arise, and can act as the glue that subsequently holds the former combatants together. Such equilibrium would be stable with a virtuous feedback between peace and prosperity. The absence of a necessary

condition – prosperity in this case – would be sufficient for the failure of a post-conflict intervention.

Finally, our highly simplified model abstracts from much of reality. The representative agent framework ignores issues of group formation and the costs of collective action. We assume full information, thus neglecting the possibility of deception. Furthermore, predation, other than consuming resources, does not create a negative externality in terms of destruction of output. Steady state assumptions ignore the dynamics of savings and investment, including for predation and defense. This, however, is a first step in understanding the mechanics of conflict and the value of externally-sponsored peacekeeping interventions in reducing state fragility.

References

Baker, Matthew J 2003. "An Equilibrium Conflict Model of Land Tenure in Hunter-
Gatherer Societies", *Journal of Political Economy*, 111(1): 24-73.

Chand, Satish 2002. "Conflict to crisis in Solomon Islands", *Pacific Economic
Bulletin* 17(1): 154-9.

Chauvet, Lisa; Paul Collier; and Anke Hoeffler, 2007. "The costs of failing states and
the limits to sovereignty", Research paper No. 2007/30, UNU-WIDER.

Collier, Paul and Anke Hoeffler 2002. "Policy, and Growth in Post-Conflict
Societies", Policy Research Working Paper Series, The World Bank.

Dixit, Avinash 1987. "Strategic behaviour in contexts", *American Economic Review*
77(5 December): 891-8

Duffy, John and Minseong Kim 2005. "Anarchy in the laboratory (and the role of the
state)", *Journal of Economic Behaviour and Organisation* 56(3): 297-329.

Economist, 2009. "Afghanistan's new militias: self defense", pp. 26-7, 11-17th April.

Glassmyer, Katherine & Nicholas Sambanis 2008. "Rebel–Military Integration And
Civil War Termination" *Journal of Peace Research* 45(3): 365-84.

Ghobarah, Hazem Adam; Paul Huth; Bruce Russett 2003. "Civil Wars Kill and Maim
People-Long After the Shooting Stops" *The American Political Science
Review* 97(2): 189-202.

Grossman, Herschel 2002. "Make us King: anarchy, predation, and the state",
European Journal of Political Economy 18: 31-46.

Hirshleifer, Jack 2001. *The dark side of the force: Economic foundations of conflict
theory*, Cambridge University Press, UK.

Hirshleifer, Jack 1995. "Anarchy and its breakdown", *Journal of Political Economy*
103: 26-52.

Leeson, Peter T 2006. "Efficient anarchy", *Public Choice* 130: 41-53.

Olson, Mancur 1993. "Dictatorship, Democracy, and Development" *American Political Science Review* 87(3): 567-76

Sandler, Todd; Hartley, Keith, eds 2003. *The economics of conflict*. Volume 1: Theory. Volume 2: Applications. Volume 3: Case studies, Elgar Reference Collection. International Library of Critical Writings in Economics, vol. 168. Cheltenham, U.K. and Northampton, Mass.

United Nations, 2009. "Fact Sheet: United Nations Peacekeeping", http://www0.un.org/en/peacekeeping/documents/factsheet.pdf

Usher, Dan 1981. *The economic prerequisites to democracy*, Oxford.