

## **Frontier Violence: Property Rights, Commons Management Costs and Distributional Conflicts**

### **Abstract**

Distributive conflict takes place in spaces where competition for assets makes economic, political, and/or strategic sense, where no overarching authority defines and enforces a given allocation of those assets, and where commons management costs are too high for competitors to reach agreements on their own. Based on the work of Alston, Libecap and Mueller on property rights and conflict on the Amazon land frontier, the framework proposed here tries to address the limitations of existing theories of distributive conflict, which contemplate either conflict in the absence of property rights, or trace distributive conflict to the inadequacies of that provision, but not both at the same time.

### **Introduction**

This paper extends the model of economic frontiers and land conflict developed by Alston, Libecap, and Mueller to propose a broader theory of violent distributional conflicts conceived as "frontier violence." The argument is straightforward: valuable economic, strategic or political assets are sometimes up for grab between the area where their capture and use makes sense (an area whose outer limits define a "value frontier"), and the area where claims over that asset are well-defined and -enforced by a third party or a coalition of competitors (i.e. a "second" party). The outer limits define a "property rights frontier." In the space between the value and property rights frontiers, competitors are sometimes able to divide things up peacefully, but they are also likely to engage in conflict when the cost of such agreements is too high. For distributive conflict to occur at all, two conditions must thus be met: a willing and able party should be unavailable to define and enforce a given distribution of a valuable asset, and competitors over that asset must be unable to reach and enforce a mutual agreement

over its allocation. This model problematizes both second- and third-party provision of order and competitors' ability to reach agreements in the absence of such provision, whereas theories of institutional weakness only examine the first problem—the provision of order—and "realist" and economic theories of conflict and civil wars only the second—cooperation in the absence of exogenously provided order.

The paper is divided in three sections. The first presents the original "frontier violence" model and situates it among contemporary discussions of crime, civil wars and interstate wars.

Section specifies and extends its component theories and shows how the frontier model's conceptualization of land conflict can be broadened to all distributive conflicts. A number of the model's logical implications are developed in section three, which proposes a series of abstract experiments involving changes in the location of the frontiers and conditions of cooperation in the absence of property rights.

#### 1- Conflict on the land frontier

Alston, Libecap and Mueller—ALM—have proposed a parsimonious economic model of frontier violence and used it to make sense of the land conflicts that have long prevailed in the Brazilian Amazon.<sup>1</sup> They argue that there are spaces where intense competition for land overwhelms the ability of the actors involved to allocate it through mutual agreements. When that happens, conflict results if state authorities are not able to effectively define and enforce

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<sup>1</sup> The following presentation is a synthesis of a number of works by these scholars who were joined, depending on the publication and specific themes, by other researchers. The formulation of the model varies slightly between these various papers, but its core propositions, on which this work is based, do not change substantially. Cf. Alston, Libecap and Schneider, 1996; Alston, Libecap and Mueller 1999a; Alston, Libecap and Mueller, 1999b; Alston and Mueller, 2003; Alston, Mueller and Cosgel, 2003).

property rights [PR] in that space or if there is uncertainty as to their willingness and ability to do so. Their model combines local theories of PR demand, PR provision, and distributive conflict and cooperation in the absence of PR. This section proposes a more detailed overview of ALM's frontier violence model and its component theories, and assesses its main strengths and limitations relative to dominant approaches to distributive conflicts in international relations, comparative politics and conflict economics.

### 1.1 ALM's frontier violence model

There are points in space where the net present value (NPV) of land is too low for anybody to be interested in exploiting it. Those points define the frontier of economic activity. Distance plays a central role here because of its impact on transportation costs, which in turn are critical to the value of land (ALM 1999a: 13). One can easily understand, however, that a number of factors can make the frontier "move." With transportations costs given, the introduction of a crop like vanilla or saffron, with higher value per volume, will contribute to pushing the agricultural frontier farther away from markets. Conversely events such as the discovery of a substitute to a given crop (synthetic rubber, for instance), a war, or an economic collapse that lowers the net market value of a good will bring the economic frontier of its production closer to the market.

This reasoning implies that the location of the economic frontier is asset-specific: transportation costs, for example, will define a much closer frontier if the crop is softwood lumber than if it is heroin or diamonds. The frontier may also be discontinuous, as in the case of far-out pockets of land on which a particular high-value crop can be grown: the space between those pockets and the market may lie beyond the economic frontier, but the pockets themselves are very much located within it.

Finally, the location of the frontier depends on the opportunity cost of poor labourers. For a given area to be situated within the frontier, the net present value of economic activity at that point in space must be higher than the opportunity costs or reserve wage of labourers. If there are massive investments and work opportunities in urban areas or in small pockets of mining activities, the agricultural frontier will be driven closer to the market, as very few people will find farm labour deep into the countryside more profitable than mining jobs or urban work in services or manufacturing.

#### a) PR demand and supply

ALM's theory of the demand for PR is tightly woven into their understanding of the frontier's economic dynamics. At first, workers settling the economic frontier define the limits of their land through informal agreements. That definition is typically very primitive and investment in the enforcement of those claims minimal: far from the market, the low returns on land exploitation imply that nobody has the means to get a formal title or much time to fence and monitor the land's limits. As more settlers arrive, as new crops are introduced, or as new roads are built, land value increases and competition over it becomes more intense, making better definition and effective enforcement not only more necessary, but also relatively more affordable. For a while, people may still prefer or manage to define and enforce their claims on their own, buying a gun, or fencing here and there and above all negotiating agreements with their neighbours. At some point, though, the costs of those informal arrangements will start to have a significant bearing on the net returns from the land, and some kind of third party guarantee, i.e. externally provided PR, will be sought (Alston, Libecap and Mueller, 1999a: 3; Alston, Libecap and Schneider, 1996: 32-33).

That demand, however, is not always satisfied. Against the so-called "naive" theory of PR (Demsetz, 1967; Eggertson, 1990), ALM show that supply does not simply increase along

with demand for PR, however large the efficiency gains from their specification may be. Their reasoning implies that even where PR make economic sense there may be zones where they are imperfectly defined and/or enforced.

The limits of effective PR provision can also be understood as a frontier where the net present value of definition and enforcement reaches zero. Paralleling the central role of distance to market for the location of the economic frontier, distance to the administrative centre will often also have a significant impact on the location of the PR frontier, as would any factor that affects the cost of their definition and enforcement or the return on those activities. ALM, however, do not identify the general determinants of the location of the PR frontier, delving instead into the particular incentives and obstacles relevant to PR provision in the specific case of land in the Brazilian Amazon. Nonetheless, they clearly situate the potential conflict zone between the areas where competition for land creates a demand for enforcement and those where PR provision is ensured.

#### b) Conflict at the frontier

The absence of government-supplied PR in areas situated within the economic frontier does not imply conflict (ALM 1999a).. What prevail are informal agreements that offer an adequate compromise between tenure security and the costs involved in negotiating and enforcing those agreements. Indeed, given the limited returns that the exploitation of frontier land provides, the cost of detailed definition and effective enforcement would be prohibitive and people do their best to accommodate one another.

In ALM's model, conflict happens only when informal agreements prove impossible to reach or when the use of violence precipitates outside PR provision. Two factors play a key role here: the number and social heterogeneity of competitors (1999a: 15), and the fact that using

violence increases the probability of government intervention, reducing the uncertainty that normally prevails in PR definition and enforcement at the frontier (1999b: 137).

The migrant labourers that have been at the forefront of Amazon colonization were few, poorly educated, similarly skilled, and economically destitute. In the case of Brazil, this implies a very weak basis of social differentiation, which simplifies negotiations and facilitates coordination. As one moves closer to the market and as land value increases, more people with diverse social backgrounds, skill sets and economic conditions become involved, making informal agreements increasingly difficult to reach and enforce. Beyond a certain point, informal arrangements will be impossible to reach, which defines a third frontier, this one defined in relation to the economic frontier, where deals are easiest to reach. This third frontier, which is present only implicitly in ALM, could be termed the "commons management" frontier, following Ostrom (2000, 2005) and Alston and Mueller (2003).

## 1.2 Scope and limits of the ALM model

### a) A tale of two equilibria

The model just outlined addresses at once two problems that are normally kept separate in the conflict literature: the problem of the provision of order, which ALM frame in terms of PR demand—by settlers—and supply—by governments; and the problem of order in the absence of an effective overarching authority, which they frame as the challenges of "commons management" (Alston and Mueller, 2003: 2, 3, 8). Their model traces conflict to the combination of inadequate provision of order by a second or third party and to the inability of competitors to reach agreements among themselves. Peace, from that standpoint, can result either from sufficient third-party capabilities to deal with competition over assets—a vertical equilibrium—or from a mutually agreed allocation of assets that satisfies competitors—a

horizontal equilibrium. Violent conflict, conversely, can only result from a breakdown of *both* these equilibria.

From the standpoint of a general theory of conflict, this double-equilibria perspective has significant advantages over existing models, because it forces one to look both at the dynamics that exists among particular competitors and at the relationship between them and those outside parties that may or not intervene to settle or prevent the conflict. A brief overview of prominent recent contributions to conflict theories shows how most neglect one or the other of these two equilibria, which limits their utility.

#### b) Horizontal equilibrium

Horizontal equilibrium approaches to conflict include balance of power theories (Wolfers, 1962), international regimes theory (Krasner, 1983; Breitmeier, Young, and Zurn, 2007), most marxian theories of class conflict and revolution<sup>2</sup> (Marx, 1993), most of defence economics' theories of conflict and cooperation "in the absence of PR" (Hirshleifer, 1995; Garfinkel and Skaperdas, 2006), theories of credible dissuasion and distributional commitments (Fearon, 1998; Azam and Mesnard, 2003; Azam 2006), and most theories of destabilizing inequality, whether between individuals, in the case of violent crime (Fajnzylber et al., 2002a, 2002b) or between self-identified groups, for broader social conflicts (Stewart, 2000). They consider that the ultimate sources of conflict lie in the distribution among competitors of the goods at stake—wealth, power, land, territory, water, etc.—and the solution in a reallocation of that good that is consistent with a broadly-shared norm or, individually or in various combinations, with the underlying needs, values, or relative power of the competitors.

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<sup>2</sup> Where the state, as the agent of the dominant class, is a party to the conflict.

These theories provide penetrating insights into the dynamics of conflict and cooperation between actors in anarchic environments. Their underlying assumption, however, is that conflict does not happen when a third party effectively enforces order, and yet the determinants of the emergence of such order are left out of their analyses. In a recent review of the field, Garfinkel and Skaperdas argue for instance that "...environments with imperfectly specified and imperfectly enforced property rights (...) are precisely the ones in which conflict typically arises" (2006: 1). From that statement should flow the conclusion that the study of conflict has to focus at least in part on the determinants of specification and enforcement of PR. Yet, their whole paper is strictly devoted to studying situations of anarchy, where PR are "imperfectly specified and enforced." In other words, the determinants of poor specification and enforcement are generally assumed to be exogenous and/or unproblematic.

### c) Vertical equilibrium

Vertical equilibrium theories include most weak and failed states theories (Jackson and Roswell, 1985; Herbst, 2000; Bates, Greif, Singh, 2002; Bates, 2008a, 2008b), in which political institutions prove unable to contain tensions between social movements or social forces broadly defined; Samuel Huntington's "praetorian politics" model (Huntington, 1965, 1968), where a broad "social mobilization" overwhelms a given country's "political institutionalization;" and Theda Skocpol's theory of social revolution (1979), where war-related state collapse opens the way to massive and violent peasant mobilizations against landlords. In these works, explicitly or not, the relevant authority's [in]capacity to impose order over fractious parties determines the probability of conflict.

Currently, the most influential of those approaches are failed state theories. Robert Jackson and Carl Roswell (Jackson and Roswell, 1982), William Zartman (1995) and Jeffrey Herbst

(Herbst, 2000; Herbst and Mills, 2009), among others, focus on the institutional characteristics of the states where conflict and violence prevail and on their ability to effectively impose order. Robert Bates recent discussion of state failure and of its central role in the violence that has engulfed many African countries (2008a, 2008b) is a case in point. Bates' analysis builds on his previous work with Avner Greif and Smita Singh (Bates, Greif, Singh, 2002), in which they propose a parsimonious theory of political order centred on tax revenue, the social contract that taxation implies, and the discount rate of rulers. In a book-length examination of the implications of the model for contemporary Africa (2008a), Bates shows convincingly that his understanding of state failure and the theory of order that underlies it enable one to make sense of much of sub-Saharan Africa's recent predicament.

Even Bates' sophisticated version of failed state theory, however, only examines the supply or order. Understanding the conditions under which undersupply prevails enables him to identify risky areas, explain many instances of violence and when and where they occurred, and even to evaluate institutional mechanisms—such as democratic elections—that can reduce or increase the incidence of violence. But his model is useless to make sense of the absence of conflict where states are weak, or the presence of conflict where the state is strong.

Bates has little to say, for instance, about the absence of violent conflict in large swaths of sub-Saharan Africa in the 1960s and 1970s—Cameroon under Ahidjo, Kenya under Kenyatta and arap Moy, Gabon under Bongo, Zambia under Kaunda, Zimbabwe in the first decade of Mugabe's consolidated rule and even Zaire during much of Mobutu's reign (Reno, 2006)—at a time when these states were by no means strong. His outlook is also at a loss to explain violence where states are not weak in absolute terms, but when they are confronted to military challenges they cannot eliminate—as happened for decades in Sudan. For the same reasons, his model would be of little use beyond Africa, for cases such as perennially weak state Afghanistan during the long and quite stable reign of Mohammed Zahir Shah (1933-1973), or

Nicaragua under the Somozas (1934-1979), much of which was uneventful in spite of the utter weakness of the state (Cuzan and Hegen, 1983), or for Sri Lanka and Colombia, which by African standards would be blessed with very capable states, and yet have been engulfed for decades in murderous civil wars. What is missing here as in other failed states frameworks is thus not only a theory of the dynamics and determinants of horizontal equilibrium—to explain how cooperation is possible in the absence of significant state capacity—but also the determinants of conflict under strong states, when the implicit "demand" for order overwhelms even substantial state capabilities. In other words, not only do these frameworks only look at vertical equilibrium, but they also only consider one side of it, the supply of order.

#### Summing up

A comprehensive theory of distributive conflict needs to include two local equilibrium theories, one about the supply of, and demand for, order, and one about cooperation and conflict in the absence of order. In addition to making sense of conflict in cases where states are extremely weak and when, in the absence of PR, competitors cannot reach agreement, that theory should enable us to make sense of trickier cases, namely: peaceful equilibria where states are weak, and conflict when states are strong. Lastly, that theory also needs to address those issues in broad enough terms for its insights to be useful to understand in the same terms all violent distributive conflicts, from appropriative crime and civil wars, to territorial conflict between states.

ALM's framework addresses many of these problems. Yet, while more comprehensive than either vertical or horizontal equilibrium models, it has a few limitations. From the standpoint of a general model of distributive violence, in particular, its focus on land issues is too

narrow. Moreover, its theories of rights provision and of informal horizontal agreements are insufficiently specified.

The next section addresses those limitations. It combines into a single framework an equilibrium theory of PR demand and supply, and an equilibrium theory of cooperation and conflict in the absence of PR.

## 2- Generalizing the frontier violence model

This section expands ALM's model into a general theory of violent distributional conflicts. It begins with the clarification of a few basic concepts, followed by local theories of value frontiers, PR frontiers, and "commons management" frontiers.

### 2.1 Basic concepts

#### a) Distributional conflicts

Distributional conflicts involve collective or individual actors' largely unregulated and sometimes violent competition over the allocation of a good. This definition covers violent crimes when they relate to appropriation, as well civil wars and territorial conflicts. It is indifferent to the nature of the actors involved and of the good(s) over which they compete and thus assumes that there is no relevant difference between conflict over territory (among states or clans) political power (among warlords or political parties), drug turf (among gangs), women (among clans or individual men), or land (among families, generations, or large ethnic coalitions). What makes conflict different from mere competition is the fact that the rules—formal or informal—that normally govern interaction are violated. While social norms or legal regulations are possibly never fully absent from even the most violent human confrontations, conflict takes place in a distinctly less regulated environment than simple competition. The extent to which, and the conditions under which, rules can be violated may

sometimes be quite well-defined, as is arguably the case for today's wars, but even in those circumstances, it is clearly understood by participants and outsiders that a state of exception prevails that involves a special, more lenient regulation of participants' behaviour.

Distributive conflict often involves violence, but not always: even competing drug gangs can reach *modus vivendi* for significant periods of time, especially when the costs and consequences of violence are significant. Violent competition does not always constitute conflict either: a boxing match or a hockey game can be extremely violent, but the use of violence by participants is quite tightly regulated (especially for boxing...). Finally, violence is not confined to distributional conflict: violent behaviour may be unrelated to the capture of a thing. Violent distributional conflict will in sum be understood here as the use of physical violence by individual or collective actors engaged in poorly regulated competition over the capture of a thing.

#### b) Property rights

In this paper, PR are understood as valid claims over "things" (material, political or symbolic) that are enforced by a second or third party "against the whole world" (Clarke and Kohler 2005). Validity is understood here as general effectiveness and means that as a rule, the claim holds without the need to constantly being upheld by force.<sup>3</sup> This definition is in keeping with contemporary property law, for which anything that can be claimed can thereby be the object of a property right, from land and water or territory, to food, political power or one's own body (Clarke and Paul Kohler, 2005: chapter 1). From that perspective, however, not all valid claims can be understood as rights. This view thus disagrees with an understanding that prevails among many institutional economists, for whom a property right can be self-enforced. In his classic *Economic Analysis of Property Rights*, for instance, Barzel (1997: 3)

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<sup>3</sup> It also follows Berger and Luckmann's classic assimilation of "validity" and "legitimacy" (1966).

defines a property right as "the ability to enjoy a piece of property." The property law perspective is preferred here, because it makes a distinction between simple possession and the existence of a property right, enabling one to consider outright appropriation without assuming that it necessarily implies a "right." Were simple possession considered sufficient, as per Barzel, the idea of legitimacy and the stability that it conveys and that is inherent to the notion of a right would be evacuated. Might may still make right, but only to the extent that the claim originally made through force ultimately finds social validation.

Also for the sake of generalization, the claimant may be an individual or a collective and outside validation may come or not from a "government." The party that enforces the right may also be a collective, such as a council of elders or a mining camp assembly, or an individual, such as a King or the head of a day-care (for "toy wars" among toddlers). The key is for that party not to be directly involved in the competition itself, although it may—and usually does—have an interest in, or benefit from, its outcome.

### c) Political orders as PR regimes

If one abides by Lasswell's classic definition of politics as "who gets what, when, and how" (1936), a broad understanding of PR enables one to conceive PR regimes and political orders in the exact same way, as systems of authoritative allocation of goods—material, political, and symbolic.

## 2.2 Asset value and property rights frontiers

### a) The value frontier

ALM's discussion of the economic frontier is very comprehensive and we will simply lift the key elements of that discussion and replace economic by value frontier to broaden its field of application beyond economic goods, for instance to territories over which states fight for

strategic and security reasons, independently of their narrowly-defined economic value. A value frontier is the point at which the net value of an asset equals the opportunity cost of the poorest actor that is seeking it. While it is useful to think of that point in spatial term, space is only one dimension along which the frontier can be defined. To the extent that it affects the value of a good, technology also defines a frontier (the technological requirements of deep-sea mining still keep lots of resources away from the market), as does risk (there is a certain level of danger beyond which very few people will try to capture a good). Every imaginable good can thus have a value frontier. In practice, the value of some goods may be so high that there is no frontier to their capture and use. When present in significant quantities, alluvial diamonds, for instance, have such a high value per volume that no level of transportation costs will make their exploitation un-economical. Similarly, in a given country, at a given point in time and with a given level of technological development, land frontiers may be "closed," meaning that all the land has a market value superior to the opportunity costs of some of the country's inhabitants. There is a technological frontier to oil extraction and arid land cultivation, however, which also implies that not all oil gets to be pumped out nor all land exploited. Moreover, as should be clear from the foregoing, value frontiers are asset-specific: the saffron frontier is not the softwood lumber frontier, which in turn is not the gold mining frontier.

#### b) The property rights frontier

The original frontier violence model is largely silent about the specific characteristics of the PR frontier. However, the provision of property rights has been discussed extensively in the institutional economics literature (Eggertson, 1990: 247-280; Anderson and McChesney, 2003) and we will build on that discussion to further specify that dimension of ALM's model. Following Anderson and Hill (1975) we understand PR provision—which covers both their definition and their enforcement—as simple supply whereby the "amount" of rights provided

corresponds roughly to the point where the marginal cost of their production equals its marginal benefits to the provider. For a given good, the PR frontier is the point at which the net value to the provider of PR equals zero.

We propose that the provision of property rights responds to the amount of "tax" revenue that can be extracted in exchange for PR provision, the value of the externalities of unregulated competition over assets, and the cost of PR provision.

In keeping with the high level of abstraction of the model, taxes should be understood here in the broadest possible sense, as the compensation obtained by a second- or third-party in exchange for the provision of property rights, from standard taxation to the fee charged by customary institutions to settle disputes, or the political support or access to natural resources that an authority or a foreign state may request in exchange for its intervention in a given conflict.

The externalities that are relevant here consist in the broad consequences for the potential enforcer of the non-definition of rights over the goods that are the object of the conflict. These consequences may be economic, as unregulated competition over an asset may affect the existing tax base of the provider; they may be political, as general instability caused, for instance, by land conflict, may threaten the power of the group that controls the government apparatus; and they may also be strategic, as for instance both stability or the danger of confrontation between middle powers over territory may be felt to impact the security of a large number of their neighbours and of the world's great powers.

The provision of property rights is costly (Anderson and Hill, 1975). At the very least, for instance in the case of land, a certain amount of information needs to be collected and processed, and some kind of record must be kept to formally register a claim. Rights enforcement implies in turn that some mechanism of conflict resolution be set up *ad hoc* or

maintained permanently, and that sanction mechanisms be made available, again either *ad hoc* or as a permanent apparatus. The value of those expenditures plays a critical role in the decision to define and enforce rights, and in the extent to which rights will be specified or protected by the third party. Moreover, as the level of specification of the rights and the quality of their enforcements are *a priori* infinite—one could have a receipt for every single knife or doorknob in one's house and five policemen on faction to make sure they don't get stolen—and consequently, the potential cost of provision also infinite, PR are not provided over everything and the definition and/or enforcement of those PR that are provided is always incomplete to some degree.

Tax revenue understood broadly to include all benefits to the provider of PR supply, externalities (political, strategic and/or economic), and net provision costs (covering both definition and enforcement) define in sum a "property rights provision frontier," which for the sake of expediency we simply call the property rights frontier.

Just like the value frontier, the PR frontier is asset specific. Measurement costs vary a lot between, say, seasonal access to a water hole and ownership of a house. It is easier to tax a fixed asset, like a manufacturing facility or a plantation, than a moving one like a herd or a truck. It is easier to protect an area that is bounded by rivers or mountains than one that sits in a flat, unbroken plain. The tax revenues that a hotel, a large industrial complex or a diamond mine can generate are much larger than those that flow from taxing street merchants, small farmers, or hunter-gatherers, making the definition and enforcement of the latter's rights much less appealing. Fight over cattle or even land, in the remote regions of a country, similarly, has few implications for the central government, either negative or positive, which as a result is unlikely to become involved. The incentive structure of the PR provider, in other words, will change according to the asset that is the object of the rights.

That being said, enforcers do not have to be asset specialists. They have in fact a strong incentive to be generalists because there are economies of scale to property rights definition and enforcement: a state or a customary authority may arbitrate conflicts over land, cars, diamonds, and children, often with the same administrative machinery. A local militia, the police or the army can similarly intervene in conflicts over all kind of goods. Providers dealing with numerous goods may use "tax revenues" from one good to regulate another, taking a generic PR frontier much farther from administrative centres than would make sense for particular goods. Territorial competition, for instance, pushes states to build a capacity to effectively control and regulate economic competition in areas where little or no such competition takes place (Tilly, 1985; Herbst, 2000). The PR frontier for a given asset will thus often reach beyond the point at which it would stand strictly on the basis of the net value of rights definition and enforcement for that particular good.

To the extent that the financing of PR definition and enforcement depends ultimately on the taxation of the assets over which the rights are enforced, the net value of PR provision cannot be higher than the total value of the underlying assets. In other words, even considering predatory taxation, which ultimately involves the confiscation of the asset, the total value of tax collection constrains the ability of the enforcers to push the frontier out: many property rights will remain undefined in spite of a the existence of a demand for them.

The overall provision costs, tax revenue and externalities of conflict for all goods over which property rights are defined define the location of an aggregate enforcement frontier. That frontier represents the limit of government reach as a rights provider. While there is no reason for governments to specify all PR within this aggregate enforcement frontier—which ultimately implies infinite costs—no right at all will be specified *beyond it*. Within the aggregate frontier, however, political and strategic dynamics will dominate the calculations of the PR provider regarding which specific rights will be defined and enforced. In the case of

the Amazon land frontier, ALM show that the role of political mobilization and the use of violence—which affect PR provision costs and benefits—ultimately determine the state's decision to supply rights.

The locations of the value and PR frontiers are independent. This implies that, for specific goods, a significant gap may develop between the two frontiers. A gap between a far-reaching enforcement frontier and a proximate value frontier is obviously unproblematic; for that reason, what will be termed a gap from now on refers strictly to the space that develops between a value frontier that lies beyond a PR frontier. When such a gap is small, say for a good that has a low market value and that is easy to tax, little will be at stake in un-regulated competition and little pressure will be put on the ability of competitors to reach agreement among themselves. In other cases, however, the market value of a good may be extremely high, but tax revenues or political benefits, as well as externalities too small, and provision costs too high to motivate involvement by an outside party. In such cases, the distance between the frontiers will be substantial, i.e. property rights will be absent from a large area where competitors may demand them and their ability to reach agreements with one another will critically affect the probability of conflict.

### 2.3 The commons management frontier: Conflict and cooperation in the absence of property rights

There is not always conflict in the gap between the two frontiers. Alston, Libecap and Mueller emphasize that uncertainty regarding institutional decisions "underlie" conflict on the Amazon frontier and growing heterogeneity among competitors plays a central role in precipitating violent confrontations (1999a:15; 1999b:137). Building on Ostrom's work, Cox, Arnold and Villamayor-Tomás (2009) have identified, for resource management, a much wider range of conditions under which collective arrangements are possible and sustainable,

for instance clarity of resource and user boundaries and relative ease of monitoring those. Similarly, when a large number of heterogeneous players compete for land beyond the enforcement frontier, the information requirements of potential deals increases, as does the difficulty of monitoring compliance and enforcing agreements against potential free riders. As shown by ALM (1999a, 1999b), agreements are also much less likely if inconsistent government policy forces players to constantly modify and renegotiate the terms of their agreement or when violence can be seen as an effective way to eliminate uncertainty regarding government intervention.

Following Ostrom (1990, 2005, 2009), we will subsume these problems under the collective heading of "commons arrangement costs," which cover transaction, information, monitoring and control costs. Conflict happens between the frontiers when the cost involved in reaching and sustaining agreements between competitors are too high.

As a rule, in sum, any factor that the costs of informal agreements over the management of the commons will increase the risks of conflict. Conversely, factors that reduce such costs, from the simple learning about others that takes place over time, to shared cultural norms regarding the occupation of land (Colin, 2008), modalities of aggregation of the competing parties –that "artificially" reduce their numbers<sup>4</sup>--will facilitate agreements and make non-conflictual commons management possible.

As these costs increase, a point will be reached beyond which no agreement will be possible, defining a commons management frontier. This frontier can also be understood in spatial terms, although distance itself does not *directly* impact commons management costs (see below for the graphic presentation). Contrary to the value and PR frontiers, however, it does

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<sup>4</sup> Such as the assembly decision rules adopted in Nevada and California's mining camps (Libecap, 1989: 29-51) to adjudicate the allocation of mining rights, or robberies and common crime.

not extend from the market or administrative centre, but from the value frontier itself, towards the market: at the value frontier, there are few players and common management costs notwithstanding, informal arrangements are likely to prevail. As one gets closer to markets, competition increases as does the costs involved in reaching and sustaining such arrangements. If the latter prove to be impossible to reach at a point that lies beyond the PR frontier, conflict is likely to emerge.

## 2.4 Summarizing the model

- 1 For distributive conflict to happen, two conditions must necessarily be present: poorly defined and enforced property rights over a given thing by a third party, and inability of competitors to reach an agreement on the allocation of that thing.
- 2 Controlling for the ability of competitors to reach mutual agreements, the incidence of conflict is directly related to the size of that gap which, in turn, depends on the location of the value and PR frontiers.
  - 2.1 The location of the value frontier is a function of the a) market value of the good and b) the impact of various cost factors on that value.
  - 2.2 The location of the enforcement frontier is a function of the net present value of property rights provision, more specifically of a) the costs involved in definition and enforcement of property rights, b) the benefits—economic, political or strategic—that rights provision generates, and c) the externalities imposed to the rights provider by not intervening in the competition over the asset.

3 In the absence of well-defined and enforced property rights, violence only occurs when competitors over a given asset are unable to reach a mutual agreement regarding its allocation.

3.1 The ability of competitors to reach mutual agreements is a function of the various costs involved in reaching and sustaining the agreement (transaction, information, monitoring and control), which can be understood as the costs of commons management. For a given asset, the point at which those costs make informal arrangements impossible defines the common management frontier.

Building on ALM's work (Alston, Libecap and Schneider, 1996: 32; Alston and Mueller, 2003: 8), the frontier violence model can be represented graphically by assuming that one cost variable affects both the net present value (NPV) of the good at stake itself, and the NPV for a given third party of PR provision over that good. Figure 1, in keeping with ALM's original formulation, uses distance to the market and administrative centre as a shared baseline, assuming—again strictly for the sake of commodity—that both centres are located at the same place. The graph should be seen strictly as a way to make the model easier to grasp, not as an accurate representation of a fully formalized model.

Figure 1: Frontier violence: the basic model

[FIGURE 1 HERE]

The graph has three component: an asset value curve, representing the net present value of the capture of an asset, which declines as distance to the market increases, to reach zero at point "a," which represents the value frontier; a PR provision curve, representing the net present value of the definition and enforcement of PR, which declines as distance to the

administrative centre increases, to reach zero at point "b," which is the PR frontier; and a commons management cost curve, which is flat because it is not directly affected by distance to the market of the administrative centre. It must be noted that the commons management costs scale is reversed on this graph, because declining such costs imply that an ever larger part of the competition, i.e. goods with an ever higher NPV, can be handled without formal definitions of property rights. Conversely, high commons management costs imply that no part of the competition can be handled properly—without conflict—in the absence of formally provided PR.

Note that as represented here, both the economic and the PR "curves" suggest, abusively, that distance has a constant impact on the value of the good at stake and of the provision of rights over that good, an issue on which the model is in fact silent.

The shaded area corresponding to the "def" triangle roughly represents the value effectively at stake in the unregulated zone between the three frontiers. In this particular representation, the distance between the frontiers is substantial, the value of the good is relatively high, and commons management costs high. As a result, the graph suggests that much is at stake in unregulated competition and consequently that conflict is likely when parties engage in such competition.

A few caveats

The purpose of this paper is to outline a parsimonious model of conflict that combines theories of vertical and horizontal equilibria. Its main contributions lie in the joint consideration of the two equilibria for all distributional conflicts and in the fuller specification of the conditions of vertical equilibria. Neither of the two equilibrium theories is meant to be complete. For instance, the discount rate of the third- or second-party rights provider (Bates-2008a, 2008b) certainly plays a role in the location of the PR frontier, and the very simple

understanding of conflict under anarchy neglects at the very least issues of credible commitment (Fearon, 1995). Even in its current simple form, however, the model enables one to build interesting hypotheses about a wide range of distributional conflicts. To maximize intuitive handiness and empirical relevance parsimony has been preferred to completeness: like rights provision, model specifications has diminishing returns. We optimize here for heuristic leverage (Herbst, 2000).<sup>5</sup>

### **3- Deploying the model**

Frontier violence has two main determinants: the size of the gap between the utility and PR frontiers, and the costs of reaching and sustaining informal agreements among the agents competing for the assets available within that area, each of which has its own determinants. In this section, we "play" with the model by examining general conditions under which the size of the gap and the conditions for informal agreements vary between cases.

#### ***3.1 Varieties of value frontiers***

As represented in figure 1, the location shape and slope of the value curve is the expression of the market, political or strategic value of a given asset and of the effect of distance on that value. Both vary from asset to asset and, in conjunction with the opportunity costs of competitors, determine different locations of the frontier. Figure 2 proposes fictitious but intuitively plausible estimates of the slope and location of corn and diamonds value curves, or more precisely of the value curves for land on which corn is harvested and diamonds extracted.

Figure 2a and 2b: Comparative Land Value Curves

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<sup>5</sup> Like rights provision, model specifications has diminishing returns (Herbst, 2000).

[FIGURES 2a AND 2b SIDE-BY-SIDE HERE]

Corn production confers an average value to land but corn is also relatively heavy and, as a result, distance to the market has a significant impact on that value. As a result, the origin of the curve will not be very high on the NPV scale, and its slope will be steeply negative, defining a value frontier that is quite close to the market and administrative center. Compared to the general model, one can see that the distance between the value and the PR frontiers is small and that, even given relatively high commons management costs, very little is at stake in unregulated competition. This implies that if conflict and violence imply any significant net costs for the competitors, they will not engage in the first or use the second.

As represented in table 2b, the land in areas where diamonds are found, by contrast, is extremely valuable. Moreover, because transportation costs per diamond is negligible, distance has relatively little impact on that value and the frontier typically stands very far from the market. In the hypothetical case represented here, there is no value frontier for diamonds within the administrative limits of the ruling authority. Assuming the same PR provision frontier as for corn land, and similar commons management costs, the change in the value of the asset creates a space in which a huge amount of value is at stake which neither formal PR provision nor commons management arrangement can allocate. In such circumstances, conflict and the use of violence, even if very consequential for the competitors, are likely to result.

A comparison of the two graphs suggests that the introduction of new crops (by changing the origin and the slope of the value function, and consequently the location of the value frontier), the construction of roads (by lowering transportation costs, thus making for a flatter curve and, here again, pushing the value frontier outward), or the discovery of precious minerals, can have a huge impact on the conflict potential in a given country: moving from cacao to

Hevea rubber in Ivory Coast, from coffee to vanilla in Rwanda, or from apricot to opium poppies in Afghanistan significantly increases land value, pushing the frontier away from markets and creating huge zones of competition in which PR provision may be deficient. Similarly, the sudden craze for biofuels has led to just as sudden an increase in the value of land suitable for sugar cane production in Brazil and the Caribbean. The construction of a railroad to export iron ore from the Serra Pelada, in Brazil's Eastern Amazon, to a huge port close to São Luis has similarly brought a large stretch of formerly "worthless" land well within the value frontier. An economic crisis that suddenly raises youth unemployment, by lowering opportunity costs, will also push the frontier outward as more people may be interested in capturing the good in spite of its low market value. All these changes imply a higher implicit demand for third-party enforcement of PR because competition for land becomes more intense and the private costs of claim enforcement in such a context high. To the extent that such a demand is not met, the incidence of conflict depends entirely on commons management arrangements and their costs. Where those are high, conflict is likely.

### ***3.2 Variety of property rights frontiers***

The location, shape and slope of the PR provision curve is a function of the benefits—economic, political or strategic—generated by the definition and enforcement of PR, of the costs of that definition and enforcement and of the negative externalities of unregulated competition beyond the frontier. The frontier will be proximate in the case of an authority that is devoid of an effective tax administration, or for goods—such as illegal drugs—that it decides not to tax. Distributional conflicts in an area that is of little strategic interests to the administrative authority, thus having limited negative implications for it, as was for example long the case for Colombia's jungle hinterland, also imply a proximate PR provision frontier. Finally, mountainous areas and generally difficult geography (Herbst, 2000), by raising the cost of both PR definition and enforcement, will also contribute to keeping the PR frontier

very close to the administrative center. All things equal, this implies that the potential zone of distributive conflict is enlarged. Figure 3a and 3b represent emblematic strong and weak states, with correspondingly distant and proximate aggregate PR provision frontiers, and the resulting areas of unregulated competition that escape commons management capabilities.

Figure 3a and 3b: Varieties of Land Value Curves

[FIGURES 3a AND 3b SIDE-BY-SIDE HERE]

### **3.2 *Changing commons management costs***

Even a large number of people may still be able to reach informal agreements about asset allocation in the absence of some authoritative third-party intervention. The main obstacles identified by the model are common management costs. This is a very broad category that includes information, transaction, monitoring and control costs. Controlling for the size of the gap between the PR and value frontiers, most of these problems are much easier to resolve among similar players or in a stable context where repeated interactions are possible and, conversely social or ethnic diversity as well as significant migrations will raise those costs. The instability induced by conflict or, to use ALM's example, the uncertainty produced by inconsistent government policies, increase information costs, and difficult geography similarly raises monitoring and control ones. Sporadic or one-time incursions by national or international bureaucracies, or by the police or the army, by disrupting existing or emerging equilibria among land settlers or among drug or diamond traffickers, have a similar effect on commons management costs, as whatever order may be emerging is doomed when those actions change the basic datum on which informal agreements were built. The impact of predictable PR enforcement is clearly conveyed in figure 4a and 4b by the changing size of the unmanaged part of value that is at stake between the PR and the value frontier. As costs get higher (i.e. when they move *down* the reversed scale), conflict becomes more likely.

Figure 4a and 4b: Changing commons management costs

[FIGURES 4a AND 4b SIDE-BY-SIDE HERE]

### **3.3 *Multiple frontier movements and "hard" cases***

The three sets of graphics presented above keep two frontiers stable while one "moves" around. Concrete situations involve multiple movements. A collapsing value frontier, an advancing PR one, and lower commons management costs imply a radical shrinking of the gap between the frontiers and, consequently, a drop in the incidence of conflict. The US market for illegal drugs appears to represent just such a case: 1) street prices have declined significantly over the last fifteen years and better economic conditions have lowered unemployment rates among young males, whose numbers relative to the general population—especially for those living in female-headed household—was also diminishing, implying a receding value frontier and lower competition over drug turf; 2) under pressure from the electorate, policing has become more effective and intense, pushing the PR frontier outward; 3) finally, more stable police presence in inner-cities has created a more predictable environment for the less numerous remaining traffickers, reducing the uncertainties surrounding the sharing of the turf, as aggressive action, more risky, became much less enticing. Informal agreements, in such a context, became easier to reach and sustain. While the model says nothing about the relative weight of those factors, it shows that the many variables at work act through their impact on the location of these three frontiers. Dynamics leading to an expanding value frontier (increasing drug prices, youth unemployment), receding PR frontier (fiscal crisis leading to cuts in law enforcement capacities) and increasing commons management costs (inconsistent policing), conversely, create an explosive mix.

There is not reason for multiple frontier movements to reinforce one another, however. Lower commons management costs may compensate more intense competition induced by higher market price for the good. A drastic drop in the price of drugs may similarly compensate less efficient and consistent policing, in spite of the latter's negative impact on the PR and commons management frontiers.

Finally, looking at the three frontiers simultaneously enables one to make sense of the "difficult" cases that we identified early: with a proximate value frontier (weak competition over low price assets), competition lacks intensity and even a weak state may have sufficient capacity to provide whatever is "demanded:" weak states are not necessarily synonymous with distributive conflict. Similarly, competition for a highly strategic or valuable asset may overwhelm the ability of any third party to provide rights over it, or of competitors themselves to agree on its allocation: the existence of a strong state is no guarantee of peaceful competition.

## Conclusion

This paper has proposed a general analytical framework for violent distributional conflicts based on Alston, Libecap, and Mueller's theory of land conflict at the frontier. The framework combines a theory of third-party provision of property rights (vertical equilibrium) and a theory of emerging agreements in the absence of property rights (horizontal equilibrium). Its main contention is that the breakdown of both equilibria is necessary for violent conflict to happen. As outline, the model addresses the main weakness of horizontal equilibrium theories, by problematizing the conditions of possibility of anarchy, and of vertical equilibrium ones, by enabling one to make sense of the absence of conflict where states are weak (low commons management costs and/or proximate value frontier) and the presence of

conflict where states are strong (high commons management costs and/or distant value frontier).

As it stands, the model is parsimonious and enables one to intuitively generate clear and testable hypotheses about the conditions under which violent distributional conflict is likely or not, whether such conflicts revolve around land, drugs, mineral resources, or territory.

Parsimony has a price however. In particular, the local theory of commons management, which does not explore the specific determinants of its various cost components, is somewhat primitive, given the state of the art in conflict economics and in the theory of common property. Nonetheless, to the extent that it considers both third-party provision of order and the conditions of conflict when that provision is deficient, the range of distributive conflicts left aside by this framework are less significant than in partial equilibrium theories, such as failed state or bargaining models.

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