Security in the Absence of a State: Traditional Authority, Livestock Trading, and Maritime Piracy in Northern Somalia*

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Abstract

Without a strong state, how do institutions emerge to limit the impact of one group's predation on another's economic activities? We consider this question in Northern Somalia, where piracy and the livestock trade are two important economic sectors. Piracy generates valuable income for certain groups, but produces a negative externality on livestock exports by raising shipping costs. We explain how this conflict can be resolved when two key conditions make cooperation between rival groups self-enforcing — first, the ratio of economic interests favors the productive (livestock trading) sector, and second, traditional institutions promote income sharing between groups. These conditions are met in the northern Somali region of Somaliland, where the exercise of traditional clan-based authority has engendered peace; but not in the region of Puntland, where such authority is weak and conflict is rampant. Our theory accounts for three empirical patterns. First, piracy is lower off the coast of Somaliland when livestock exports are high, but there is no such relationship in Puntland. Second, conflict rises in both regions after increases in pirate attacks off their respective coasts, but the relationship is noisier in Somaliland. And third, export price drops trigger conflict in Somaliland but not in Puntland.

Key words: conflict, cooperation, imperfect monitoring, price shocks

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1 Introduction

An important function of the state is to promote cooperation among groups, limiting the inefficient externalities that one group's predation creates for the productive activities of another.[1] To provide this function, the state requires the institutional capacity to maintain law and order, enforce contracts, and engender peace. In some states, the formal institutions that support cooperation are absent, and it is up to rival groups to locate and implement a *self-enforcing agreement* that finds peace between them.

This paper examines one region of the modern world—northern Somalia—where traditional clan-based authorities operating locally at the level of sub-clans or lineage groups (hereon simply "clans") have been able to discover and support such self-enforcing agreements with varying degrees of success. For the past twenty years, and throughout much of Somalia's history, the provision of basic public goods such as economic governance and security has been the purview of clan leaders who rely on the informal institutions of traditional clan authority.[2] Somalia's longtime ruler, Siad Barre, sought to dismantle traditional institutions and limit the authority of clan leaders, but clan structures were resilient to his efforts and the country reverted to these institutions after his regime (and the Somali state) collapsed in 1991. Clanship to this day remains the fundamental basis of security in Somali society.[3]

As the key providers of local governance in northern Somalia, clan leaders have grappled with the dramatic rise in maritime piracy in the Gulf of Aden that took place after 1991. In addition to damaging international trade, this increase in piracy has affected the terms of Somalia's crucially important livestock sector. Even when pirating attacks are not directed at ships transporting Somali livestock abroad (as they typically are not) piracy hurts the livestock trade because it increases shipping and insurance costs. The income of Somalia's livestock herders is thus inversely related to the frequency and scale of pirating attacks off the Somali coast, creating the potential for conflict between clans that vary in the extents to which piracy and the livestock trade contribute to their income. Without a state to limit piracy and enforce cooperation, the clans themselves have had to find peaceful ways to resolve their differences. Clans in the two northern Somali regions of Somaliland and Puntland have shown markedly different levels of success in their ability to find peace.

In this paper, we outline a model that accounts for the divergent paths of Somaliland and Puntland. Our model is built upon two key features of the relationship between livestock trading groups and pirating groups. The first is that the livestock traders have incentives to sanction piracy when they have evidence that piracy is on the rise. The second is that

[1] Hobbes (1651) in *Leviathan* argued that the state's authority derives from a social contact to maintain order and avoid a collapse to the disorderly and violent "state of nature." The idea that the state has a role in protecting property rights, and fostering development, was further developed in several literatures, notably by Olson (2000), Evans (1995) and others in the literature on the "developmental state."

[2] See, for example, LeSage (2005).

[3] See Gundel (2006) and Lewis (2004, p. 102).

it is difficult to monitor piracy. The livestock traders cannot know just how much piracy is taking place, and must infer it from noisy signals of pirate activity such as their own revenues and the observable income of the pirates. This feature makes it impossible to sustain a self-enforcing agreement in which there is perpetual cooperation between the two groups, but some cooperation may be possible with the help of these noisy signals.

In times when livestock exports are up, the livestock trading clans can cooperate with the pirating clans by sharing part of their income from the livestock trade in exchange for the pirates reducing their overall level of piracy. This benefits the livestock group because it mitigates the negative externality that piracy has on the livestock trade. However, to provide the pirates with the incentive to lower their piracy, the livestock traders must (credibly) threaten the pirating clans with conflict when they have evidence that piracy is on the rise. But because the evidence for piracy is noisy, conflict will sometimes take place even though the pirates are not cheating.

For this mode of cooperation to be self-enforcing, two conditions must be met: (i) the punishment to pirates for cheating should be sufficiently great—which happens when livestock interests overwhelm pirating interests—and (ii) the rewards to pirates for cooperating must be sufficiently great—which happens when clan leaders can successfully encourage existing practices of income sharing in society. Both of these conditions are met in Somaliland but not in Puntland. In particular, clan leaders in Somaliland have been able to find ways of cooperating, building an agreement that has begun to resemble a formal state. They have done so by promoting a traditional system of cooperative income sharing in society that goes back to pre-colonial times. Puntland, in contrast, remains an economically fragmented, conflict-ridden society, with high levels of violence and weak state institutions.

Our model helps make sense of three patterns that we see in the data from Somalia. The first is that piracy is lower off the coast of Somaliland when livestock export levels are high, but there is no relationship between piracy and livestock exports in Puntland. The second is that increases in conflict appear to follow increases in piracy in both regions, but this relationship is subject to more noise in Somaliland. The third is that export price drops appear to be followed by periods of conflict in Somaliland, but not in Puntland.

It is difficult to make sense of this set of patterns with other theories. Consider for example, the explanation that a decline in the price of livestock lowers the opportunity cost of conflict, making it a more attractive economic activity. This could explain why the relationship between prices and conflict exists in Somaliland, but it fails to explain why it does not exist in Puntland, where the livestock trade is also a significant economic sector. Alternatively, consider the related "labor market substitution theory" that the relationship between livestock exports and piracy in Somaliland can be explained by livestock traders shifting to piracy when exports are down, and pirates shifting to the livestock trade when exports are up. This explanation also does not account for the absence of the relationship in Puntland.

Our theory accounts for the full set of empirical patterns, and it suggests a new way of looking at the problem of cooperation and conflict in Northern Somalia. It also suggests that development policy should take care to consider a wide range of possible causes of piracy and conflict beyond the ones that have been traditionally emphasized.

Related Literature Our paper relates to the literature on inter-group cooperation and order under anarchy. In this literature, Bates, Greif and Singh (2002) develop a theory in which property rights can emerge in stateless societies, provided that "citizens ... also invest in the capacity for violence" (p. 624). Exploring similar themes, Skaperdas (1992) argues that cooperation can result if one group is able to dominate the other, consistent with our argument that the dominance of the livestock trading group in Somaliland helps explain why we see greater cooperation there. Fearon and Laitin (1996) study the role of in-group social sanctioning in enforcing cooperation across groups, hinting at the possibility that group leaders (in our case, clan elders) play an important role in encouraging such behavior.

Our paper also relates to prior studies of the consequences of statelessness in Somalia beginning with the work of Laitin and Samatar (1987), and especially to recent scholarship that explains the divergent development trajectories of Somaliland and Puntland. Eubank (2012), for example, attributes the success cooperation between groups in Somaliland to the absence of a foreign aid curse. More in line with our perspective, Jean Paul Azam emphasizes the importance of income sharing in Somaliland's state-building efforts, and also suggests that ethnic heterogeneity and fiscal institutions play a key role in explaining the differences between Somaliland and Puntland (Azam, 2006, 2010). However, the mechanism that he highlights differs from ours. In his model ethnic heterogeneity has made Puntlanders relatively myopic, which, combined with the weaker ability of the Puntland government to raise revenue and discipline bandits, has hindered cooperation.[4]

In a more general study of state building in Africa, Herbst (2000) suggested that geographic endowments and demographic features, rather than colonial history, determined the success or failure of state building projects. Herbst, however, emphasized population density as a key structural determinant, whereas we focus on the relative proportions of conflicting interests in the population. These conflicting interests are also central to the a model outlined by Shortland and Varese (2014), in which the variation in piracy off the Somali coast is explained by the decision of a "protector" that chooses whether to allow pirating activities or to protect productive trade. Their model, though different from ours, also suggests that predation can be reduced by strengthening the productive sector.

[4]Because of these structural differences, Azam is also skeptical that "export[ing] the solution that worked in Somaliland to the rest of Somalia would ... bring about the same benefits" (p. 162 in Chapter 9 of the World Bank report, "Transport Infrastructure and the Road to Statehood in Somaliland").

Other works that explain the rise in piracy off the Somali coast include Murphy (2011), Chalk (2010) and Pham (2010), all of which focus on the weakness of formal state institutions after the state collapsed in 1991. The collapse of the Somali state, however, provides only an incomplete explanation for Somali piracy. Piracy occurred even with reasonably strong institutions in place, as was the case under European colonial rule through the 1950s. Moreover, there is a great deal of variation in when and where piracy occurs around the Somali coastline, which cannot be explained solely by reference to the collapse of the central Somali state.[5]

One of the few works that deals with explaining the spatial variation in piracy is Hansen (2009), which suggests that local governance institutions rather than the central Somali state might be best placed to provide effective piracy prevention. However, Hansen focuses on local *formal* institutions in Somaliland and their conspicuous absence in Puntland. While such institutions are no doubt important, the exclusive focus on formal institutions is problematic because in much of northern Somalia these institutions lack both the relevance and capacity to effectively counter piracy. Within their respective territories the Somaliland and Puntland authorities "are not the main suppliers and enforcers of law" (Powell, Ford and Nowrasteh, 2008). Even in Somaliland, seen by many as a bastion of stability and order within Somalia, the formal judicial system is "mired in incompetence, corruption and political indifference" (ICG, 2005, p. 27), and its reach barely permeates through urban populations.[6] Our study differs from this work by highlighting the importance of *informal* institutions, particularly traditional clan institutions.

Our paper also relates to work on the effects of economic shocks on conflict. Dal Bó and Dal Bó (2011) argue, for example, that if predation is more labor intensive than production, predation rises with positive shocks to capital intensive industries and declines with positive shocks to labor intensive ones. Dube and Vargas (2013) find evidence for this in Colombia by comparing price shocks in the relatively capital intensive oil sector to those in the relatively labor intensive coffee sector. Bazzi and Blattman (2014), on the other hand, show that there is limited evidence that positive income shocks have any effect on conflict onset, but may reduce conflict duration even in countries with mostly capital intensive industries. In particular, they find limited evidence that fighting increases when there is more to fight over.

Our explanation for how price shocks affect conflict is different from the explanations studied by this literature. In our model, a negative price shock does not directly affect the material tradeoff between production and predation; instead, it serves only as a noisy signal of defection in a low information environment. This is essentially the same mechanism that breaks

[5] One notable exception in this literature is Percy and Shortland (2013), who highlight the impact of variation in the degree of instability and disorder within Somalia over time, arguing that there exists a "sweet spot" between conflict and a fully functional state that allows the business of piracy to operate effectively. Their argument makes sense of temporal changes to Somali piracy, but does not account for spatial variation.

[6] Even in urban areas, these institutions are unlikely to have much relevance in the fight against piracy since Somaliland only signed an anti-piracy law into effect in 2012.

the possibility of perpetual cooperation in the Green and Porter (1984) cartel model.[7] Our paper applies the same insight to the relationship between price shocks and violent conflict, suggesting a different mechanism than the ones empirically investigated so far.

2 Background to Northern Somalia

We provide a brief background to the two main economic sectors of our focus, the livestock trade and piracy. We then describe how clan structures and authority vary across Somaliland and Puntland with respect to the relative interests that they have in these two sectors and the forms of economic governance that they provide. The central differences we highlight are that (i) clans with relatively greater interest in livestock trading, as opposed to piracy, are more predominant in Somaliland than in Puntland, and (ii) although clan authority is important in both regions, clan leaders are a significantly stronger source of authority in Somaliland, especially when it comes to promoting cooperation through income sharing across groups.

2.1 The Livestock Trade

According to the World Bank, the largest economic sector in northern Somalia is the livestock trade, which accounts for 40% of GDP in Puntland and 30% of GDP in Somaliland.[8] Majid (2010, p. 11) reports that the northern Somali livestock trade involves the export of more than US$200 million worth of live animals across the Gulf of Aden each year. Similarly, livestock exports through the port of Bosaso in Puntland alone brought in $113 million in 2011 (Oliver, Jablonski and Hastings, 2014).

The main foreign buyer of Somali livestock is Saudi Arabia, and the main export among varieties of livestock is goat (though camels and cattle are also common). Saudis prefer Somali livestock to alternatives from other major providers such as Australia, due to its provenance from a Muslim country. This is especially the case during the Hajj season when demand is high due to the sharp increase in pilgrims visiting Mecca. Somali livestock traders employ shipping companies to move livestock across the Gulf of Aden with the majority of these companies owned by businessmen from Somalia, Yemen, Saudi Arabia, and Pakistan, who typically start their shipments at the two main shipping ports of Berbera in Somaliland and Bosaso in Puntland. Local sellers at these ports are often middlemen who buy livestock from nomadic pastoralists in the hinterland and bring them to the ports, which are linked to the

[7] See also Yared's (2010) model of war and Fearon and Laitin's (1996) model of inter-ethnic cooperation.

[8] These data are from "Puntland Facts and Figures 2003," Ministry of Planning and Statistics, Puntland State of Somalia, released by the World Bank and the January 29, 2014 press release "New World Bank GDP and poverty estimates for Somaliland." These Puntland source also estimates that the livestock sector accounts for 60% of its employment opportunities, and 80% of foreign exchange earnings. Since the Somali economy has been largely stagnant, it is unlikely that these numbers have changed dramatically to the point where the livestock sector is now insignificant in either region.

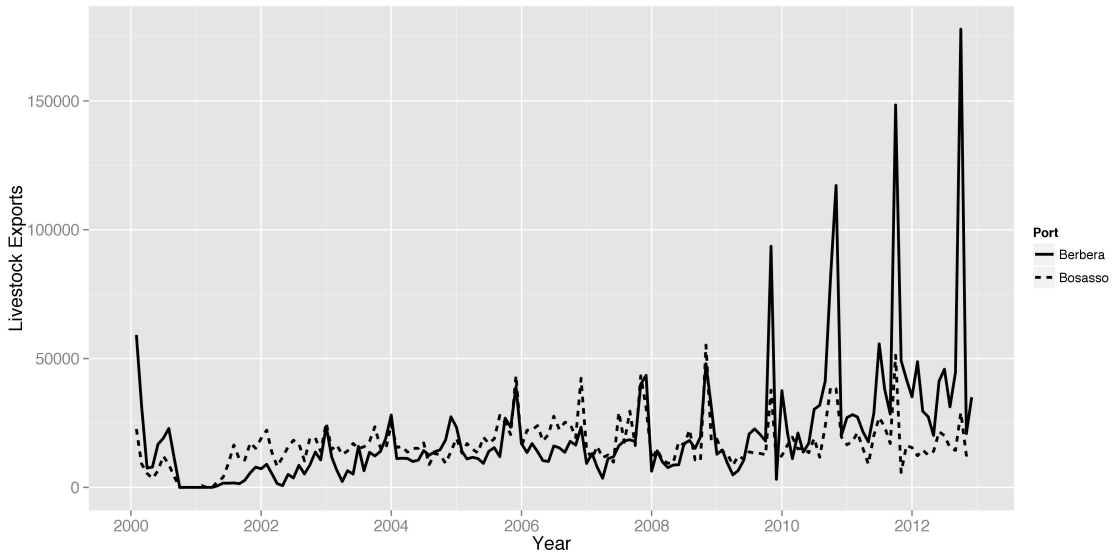

Figure 1. Monthly total livestock exports from the ports of Berbera and Bosasso, 2000-2012, collected by the Food Security and Nutrition Analysis Unit – Somalia (http://www.fsnau.org/).

hinterland through a series of clan-based networks that manage the transportation and trade of livestock (Majid, 2010). These trade networks are of ancient origin, with clan-based protection for livestock caravans noted from the fourteenth century (Umar and Baulch, 2010, p. 16).

Clan authority is critical to the operation of the livestock trade. The clan-based insurance system mitigates risk for herders and traders in a context where clan arrangements provide the only form of security against issues such as infringements of grazing rights, animal theft, and reneging on loan agreements (Umar and Baulch, 2010, p. 18). For example, dispute resolution falls under the purview of clan leaders who act as judges in an *ad hoc* court known as *guddi* in which traditional *xeer* law prevails. This is a form of customary unwritten law that is passed down orally, and has evolved to maintain a set of principles that are applicable to any type of situation or conflict. As such, it is almost never silent on any given conduct (van Notten, 2005). Modern application of the law accommodates certain aspects of *shari'a* law as well, though when the two might conflict *shari'a* law is typically subordinated to clan traditions (Gundel, 2006). This system of informal local economic governance provides strong disincentives against economic misconduct through a norm of collective liability known as the *diya* system, under which the entire clan becomes liable for a breach of contract by any one of its members.

Our main data on the livestock trade are depicted in Figure 1, which shows livestock exports over time from the two ports of Berbera and Bosasso, measured as the number of heads of livestock (summing over camels, cattle, and goats) exported monthly from each of

the two ports.[9] The data reveal several patterns worth noting. First, there is a seasonality in trade with exports rising sharply during the Hajj. Second, there has been a gradual increase in exports since November 2009 after the removal of a Saudi ban on Somali livestock that started in 2000 following an outbreak of Rift Valley Fever in Yemen and Saudi Arabia. During the ban, exports to Saudi Arabia from Berbera were severely limited, though unofficial exports and indirect exports continued to hold (with livestock being first exported to Djibouti, quarantined, and checked for illness before being sent to Saudi Arabia). Third, the data also appear to corroborate accounts from Majid (2010) that Bosasso may actually have benefited from the ban by becoming a channel for such unofficial exports prior to 2009. Fourth, exports from Berbera have been higher after 2009 than exports from Bosaso.

2.2 Piracy

There is a long history of predation against foreign vessels around the Somali coast, and of piracy directed against the dhow (shipping) trade that plies the Gulf of Aden (de Wijk, Anderson and Haines, 2010). While these predatory activities were restricted under the Barre regime, maritime piracy off the Somali coast exploded after the regime collapsed in 1991. Figure 2 shows monthly counts of piracy incidents from February 2000 to December 2012 within a 250 kilometer radius of the ports of Berbera and Bosaso. The figure highlights the substantial variation in rates of piracy, both spatial and temporal, across the northern Somali coast. In terms of spatial variation, the notable pattern is the greater number of pirate attacks off the coast of Bosaso than off the coast of Berbera.

The World Bank estimates that ransom payments from piracy have brought in an annual average of $53 million to the Somali economy since 2005.[10] Ransom payments in 2011 alone from pirate attacks in the Gulf of Aden generated $163 million in revenue for the Somali economy. These numbers indicate that although piracy is a smaller sector than the livestock trade, it is still a large income generator in northern Somalia. At the same time, it has the potential to produce negative spillover effects on the wider Somali economy, including the livestock trade. For example, during periods of intense piracy the number of ships willing to ply the routes between northern Somalia and the Arabian Peninsula declines, often leading to an over-supply of livestock at Somali ports, which in turn drives down the prices received by traders and herders.

[9] The note below the figure reports the source of these data. Summary statistics for these data, and all other data used in this paper, are given in the Supplemental Appendix.

[10] See the World Bank report titled "The Pirates of Somalia: Ending the Threat, Rebuilding the Nation." Somewhat conflicting, but similarly large figures are estimated by Besley, Fetzer and Mueller (2015), who report that Somali piracy has produced revenues for pirates of approximately $120 million, but the global welfare loss from this piracy (mainly in the form of shipping, monitoring and insurance costs) exceeds $630 million. Neither these authors nor the World Bank separately estimate the domestic costs of piracy in only Somalia.

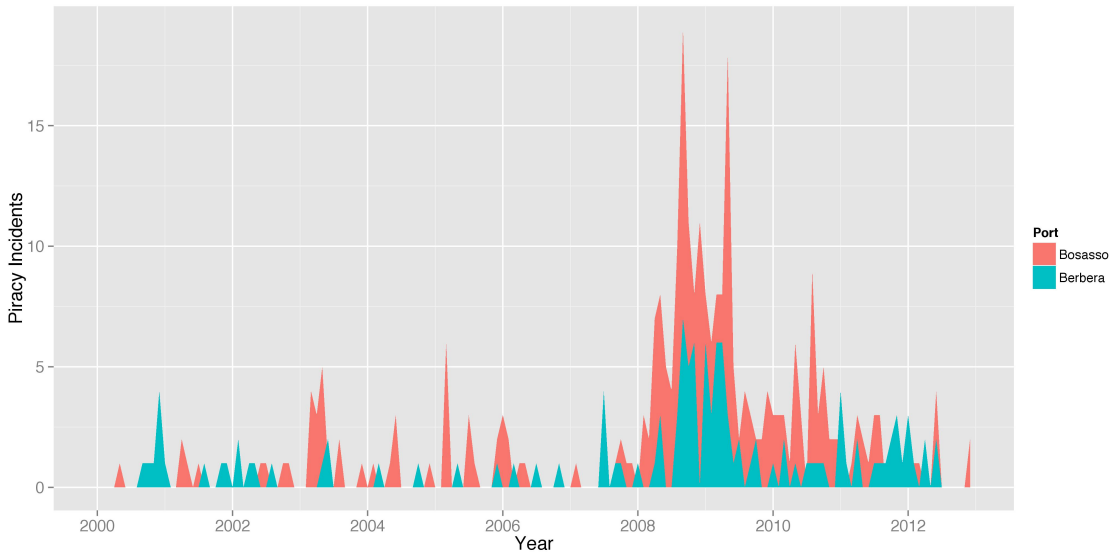

Figure 2. Monthly counts of pirate attacks within a 250 kilometer radius of the ports of Berbera in Somaliland and Bosasso in Puntland, 2000-2012. These are all attacks reported in the Anti-Shipping Activity Messages (ASAM) database compiled by the United States National Geospatial-Intelligence Agency. ASAM can be accessed at http://msi.nga.mil/NGAPortal/MSI.portal. Our data were accessed on July 9, 2015.

Another channel by which piracy hurts the livestock trade is by increasing shipping and insurance costs. Agreements between traders and shipping agents factor in some potential losses that may occur during the sea journey, with exporters bearing up to 1% of loss of sheep and goats, and 2% of cattle. Any losses exceeding these are typically compensated by the shipping company (Umar and Baulch, 2010, p. 35). As a result, increases in piracy that make sea journeys across the Gulf of Aden more dangerous increase the risks that shipping companies face, raise transportation costs and drive down their value from trade. Besley, Fetzer and Mueller (2015) estimate that the upsurge in Somali piracy in 2008 led to an 8% to 12% increase in international shipping costs, which they attribute mostly to higher insurance and security costs. Therefore, although the vessels attacked by pirates might not themselves always represent local victims, Somali piracy is harmful to the livelihoods of many Somalis if it negatively affects the terms of the Somali livestock trade.[11]

While we lack direct quantitative evidence on the harmful effects of piracy on the terms of the livestock trade, the negative impact of predation on trade is borne out by local news reports. These reports suggest that piracy increases shipping costs, as trade ships charge

[11]Oliver, Jablonski and Hastings (2014) suggest yet another channel by which Somali piracy hurts the Somali economy: they estimate that ransom earnings from Somali piracy had the effect of appreciating the local currency and reducing export competitiveness.

higher transportation costs due to greater security expenses.[12] Although the international media tends only to report the most audacious attacks on international tankers and container ships, for many years Somali pirates have targeted the cargo dhows and light coastal freighters that make up the bulk of the area's maritime trade.[13] This includes vessels of different sizes transporting livestock to the Arabian peninsula out of both Berbera and Bossaso.[14] In 2011, for example, pirates captured a livestock ship in the runup to the Hajj, the most lucrative part of the year for the livestock trade, and were reportedly killed within hours by "irate traders and herders."[15]

As a result of its negative externalities for the livestock trade, piracy has the potential to invoke sanctions from different parts of Somali society. When pirate attacks are successful, the pirates typically route the captured vessel to a private port, which in the face of potential sanctions requires protection and support from local accomplices. In order to function effectively, therefore, pirate groups require the complicity of groups onland, in particular local clan leaders. Interestingly, these leaders, in an attempt to allow both the livestock and pirating sectors to flourish, provide both support for *and* sanctioning against piracy. Shortland and Varese (2012) describe how clan complicity facilitates piracy, with some clans providing "protection" to pirates. At the same time, since *xeer* law forbids criminal activities such as abduction, theft, extortion, and fraud (and many clan leaders view piracy as belonging to this category, in addition to being *haraam*, i.e. forbidden, under *shari'a* law), clans leaders are able to provide a meaningful source of disincentives against piracy.[16]

The influence of clan elders over pirates is reinforced by the fact that pirate gangs tend to organize within rather than across clans, maintaining these "familial" ties by transfering "Qaaraan" ("livestock or money for the needy,") to the clan (Hansen, 2009, p. 25-26). Backhaus (2010) also notes the importance of pirate leaders being well established and connected in the local community through clan ties, and suggests that Somali pirates actively avoid attacking ships which belong to members of their own clans. Reports of clan elders pressuring pirates to release vessels in Puntland, and mediating conflicts involving pirates in both Puntland and the central region of Galmudug, suggest that clan leaders often have authority over pirates that formal authorities lack.[17]

[12] See for example "The Real Costs of Piracy on Locals", *SomaliaReport*, 03/27/2011, and "Life in Bosaso", *SomaliaReport*, 03/01/2012.

[13] "Somalia Pirates' Last Stand", *African Business*, 01/03/2000.

[14] "Somalia: Puntland force prepares to rescue livestock boat from pirates", *Garowe Online*, 04/03/2010; "Pirates Hijack UAE Vessel, Says Official", *SomaliaReport*, 07/14/2011; "Weekly Piracy Report", *SomaliaReport*, 08/12/2011; "Daily Media Roundup", *SomaliaReport*, 08/15/2012.

[15] "Hope is four-legged and wooly", *The Economist*, 10/15/2011.

[16] For example, clan elders pressured for the release of eight pirates who had been arrested by Ahlu Sunna Waljamma'a, a paramilitary group allied to the Somali government. "Pirates Get Ready for More Attacks, Confusion Over Possible Oil Tanker Hijack", *SomaliaReport*, 02/17/2012.

[17] "Pirates Release MV LEILA", *SomaliaReport*, 04/12/2012; "Reconciliation of Clans in Rako-Raho", *SomaliaReport*, 04/03/2012; "Pirates Initiate Clan Conflict in Daba-Galo", *SomaliaReport*, 04/21/2012.

Exactly how clan leaders manage social relationships and economic governance is complicated, but it varies across the two regions of northern Somalia in ways that, we argue, help account for the spatial variation in piracy in particular, and the divergent development paths of Somaliland and Puntland in general. We now provide more details on clan authority, and discuss the differences in clan authority and structure between Somaliland and Puntland.

2.3 Clan Structure and Authority in Somaliland and Puntland

Despite the importance of clan structures and authority in both Somaliland and Puntland, clan interests and composition vary considerably across the two regions.

In Somaliland, the Isaaq clan-family makes up the vast majority of the population. The Isaaq contains a number of confederacies, themselves consisting of various sub-clans. The largest of these in Somaliland is the Habr Awal, a merchant class that has benefited from proximity to Somaliland's crucial trading port of Berbera. Despite their various tribal delineations, the Isaaq are unified by the fact that they are almost entirely nomadic pastoralists (Lewis, 1969, p. 23-24). In this regard they are very similar to the Esa and Gadabursi sub-clans in the furthest north-west part of Somaliland, who belong to the Dir clan-family. Much like their Isaaq neighbors, the Esa and Gadabursi are pastoral nomads (Lewis, 1969, p. 25).

A very small proportion of Somaliland's population come from the Dulbahante and Warsangeli sub-clans, concentrated in the north-eastern province of Sanaag (Lewis, 2008, p. 99). Both the Dulbahante and Warsangeli are primarily pastoralist groups, though the Warsengeli "are much given to seafaring and compose the bulk of the crews manning the dhows which ply between Aden and Somaliland" (Lewis, 1969, p. 21). Because of their comparative advantage at sea, members of this group have also been known to engage in piracy, and a major pirate network operated for some time out of Las Qoray in north-eastern Somaliland (Murphy, 2011, Palmer, 2014). Thus, piracy represents a small part of the economic interests of groups in Somaliland, and "pirate clans" are very much in the minority in the region. Since the majority of clans rely on pastoralism, the ratio of economic interests in Somaliland very much favors the livestock trade.

Clan structure and authority in Puntland is considerably different. Although most clans fall under a single clan-family (the Darod), the distribution of economic preferences across these clans has made governance more difficult. As noted above, the Darod contains numerous confederacies and sub-clans, including the Dulbahante and Warsengeli, which straddle the border between Somaliland and Puntland. Far more numerous in Puntland, however, are the Mijerteen, another Darod sub-clan. Along with the Warsengeli, the Mijerteen have traditionally engaged in both pastoralism and seafaring activities, and a sizable proportion of the Mijerteen (roughly 12%) are fishermen and sailors (Lewis, 1969, p. 20). The vast majority of fishermen

in the region come from this group, many of whom turned their seafaring skills to piracy after the collapse of the Barre regime.

Piracy, in fact, was not a new venture for the Mijerteen, who have a long history of engagement in maritime predation dating back to the early nineteenth century (Durrill, 1986). This was true for communities across the north-eastern and eastern coastlines of Puntland, with ships being lured onto the rocks to be pillaged and shipwreck survivors being taken hostage for ransom. Pirates, moreover, were linked to a broader political system of predation (de Wijk, Anderson and Haines, 2010, p. 44-5). This widespread engagement in maritime predation resurfaced in the 1990s, with pirate gangs operating out of a number of locations around the Puntland coast (Murphy, 2011). This posed a challenge for others in Puntland, who suffered from the expansion of the pirate sector. As Dua and Menkhaus (2012) note, "thanks mainly to the accident of geography, a handful of clans dominate the [piracy] business, while other clans benefit only marginally or not at all" (p. 759).

The piracy business is therefore much larger in Puntland than it is in Somaliland, both in absolute and in relative terms. While the various Darod sub-clans all have sizable interests in pastoralism, many of them also have an interest in piracy, much more so than any of the groups in Somaliland. As a result, the ratio of economic interests in Puntland is more balanced between piracy and the livestock trade.

The differences between Somaliland and Puntland in terms of clan influence are not just limited to the numerical composition of clans groups and interests in these regions. Clans are much more a part of the governance structure of Somaliland, and their role in society has been recognized even somewhat formally by the Somaliland state. Starting in 1991 a series of congresses and peace talks involving clan elders were held in northern Somalia, bringing together all the major clans in the region (Farah and Lewis, 1997, Huliaras, 2002, Walls, 2009). By 1993 this led to a National Charter establishing a government, rights, and basic national institutions. Key to this development was the formation of the *Guurti* assembly of clan elders as a chamber of Somaliland's bicameral legislature to facilitate cooperation across clan groups. This assembly has, to a large extent, succeeded in this mission through the guarantee of national revenue-sharing, including export revenues from the port of Berbera and those from the national airport at Hargiesa, which include air taxes and landing charges (Lewis, 2008, p. 95-96). And, in general, the numerous confederacies of clans and their constituent sub-clans in Somaliland have been able to negotiate competing interests to settle both inter- and intra-clan disputes.

Groups in Puntland have attempted to form clan-based agreements akin to those in Somaliland, but with almost no success. Attempts to form a unified state have been less successful, in large part due to inter-clan conflicts and a relatively unconstrained executive after Colonel Abdilliahi Yusuf emerged as an iron leader of Puntland, who showed an interest in emulating the attempt by Somalia's longtime ruler, Siad Barre, to limit the influence of clan elders and

stamp out "clannism" (Hesse, 2010). A key implication of this has been the lack of any broad-based commitment to national revenue-sharing along the lines of that seen in Somaliland.

3 Theoretical Model

Our explanation for the different trajectories of Somaliland and Puntland is that the two regions of Somaliland and Puntland differ in terms of the ratio of economic interests and the institutions for income sharing in society. The ratio of economic interests favors the livestock trade more in Somaliland, while there is a greater degree of revenue sharing among clans in Somaliland than in Puntland. We build these two factors into a model of conflict and cooperation that we develop formally in the Supplemental Appendix.

The model has several features that are relevant to our data analysis; we provide an informal summary of these features here. First, conflict between groups onland takes place after spikes in piracy for a variety of reasons highlighted by existing explanations for conflict. These include the fact that pirates bring back income that creates a windfall of resources to compete over, and the fact that clan leaders may have social incentives to sanction piracy, as discussed above. As a result, peace requires the active cooperation between clans who rely on piracy as a major source of their income and those that rely comparatively more on the livestock trade. Ideally, clan leaders would like to strike an agreement wherein the pirates reduce pirating attacks during periods of high trade in the livestock sector, such as during the Hajj, and in return the livestock trading clans compensate the pirates by sharing some of their livestock income.

Second, to sustain such an agreement, the livestock traders have to know that the pirates are keeping their end of the bargain. The challenge, however, is that piracy is an activity that takes place at sea, whereas, the livestock traders are based on land. Moreover, even if some key players in the livestock trading business could directly observe detailed information on pirating attacks, transmitting this information through the informal trade networks that characterize the livestock herding operations in the Somali hinterland is riddled with frictions. For these reasons, our model captures the situation as being one of *imperfect monitoring*.

In such a situation, there is no equilibrium that sustains perpetual cooperation between the groups, and the livestock traders must use noisy signals of defection by the pirates to determine when to punish them so as to provide them with incentives to keep their commitment to lower piracy during the periods of high trade. One such signal is simply the the pirates' own incomes: when clan leaders have direct evidence that piracy is on the rise, they not only have a social motivation to sanction piracy, but also a strategic incentive to deter it. Another signal is the price that traders receive at the ports, for their livestock: when piracy is on the rise, the foreign traders (who have high monopsony power) transfer some of the increased transportation costs as a result of spikes in piracy on to the local sellers by offering them lower prices. Thus livestock prices serve as a noisy signal of whether or not pirates are in fact cooperating.

Finally, to make cooperation self-enforcing, it is beneficial for the livestock traders to both be able to reward the pirating clans by sharing more of their revenue during periods of high trade, as well as to punish these clans more severely after evidence of cheating. These rewards are more limited in Puntland than in Somaliland, which we argued above does not have as robust institutions for income sharing. The punishments are also less likely to be severe in Puntland not only because the livestock clans are proportionately fewer there than they are in Somaliland, but also because their share of total income is lower (so they are also likely to be weaker). For these reasons, our model suggests that the cooperative agreement described above may be self-enforcing (and in put in practice) in Somaliland, but not in Puntland.

These differences generate the following predictions: (i) Since the livestock clans and the pirates are cooperating in Somaliland, pirating attacks are more frequent of the Somaliland cost when livestock exports are low and less frequent when they are high. However, the relationship should not exist in Puntland, where groups are not cooperating. (ii) Since there is less cooperation in Puntland, there is generally more violent conflict there than in Somaliland. Nevertheless, conflict rises after spikes in pirating attacks in both regions due to the social motivations to sanction piracy. (iii) A drop in local meat prices, or any exogenous source of variation that results in a drop in local meat prices, causes conflict to rise in Somaliland since these prices are used as noisy signals to sustain cooperation. However, the same relationship should not exist in Puntland, where the cooperative equilibrium is not being played. Since conflict in Somaliland rises after exogenous price dips that are unrelated to conflict, this also suggests that the relationship between conflict and piracy is subject to more noise in Somaliland than it is in Puntland. We now show that these patterns hold up in the data.

4 Empirical Patterns

Our theory helps make sense of three empirical patterns that we see in the data from Somalia. The first is that piracy tends to be lower off the coast of Somaliland when livestock export levels are higher, but there appears to be no relationship between piracy and livestock exports off the coast of Puntland. The second is that in each region, conflict appears to rise after increases in pirate attacks off its coast but this relationship is measured with much greater noise in Somaliland than in Puntland. The third is that drops in the export price of Somali livestock trigger conflict in Somaliland but not in Puntland.

4.1 Piracy and the Livestock Trade

To examine the relationship between piracy and the livestock trade, we estimate negative binomial regression models in which the dependent variable is a count of pirate attacks and the the main independent variable is the (logged) number of heads of livestock exported monthly

from each port. Livestock export data are the same data depicted in Figure 1 and piracy data are the data depicted in Figure 2 (see the notes below these tables for more details on these data and their sources).

Because pirate attacks closer to ports are likely to have a greater impact on shipping and insurance costs, we use a spatially-smoothed version of the piracy variable, down-weighting those attacks that occur further away from the ports. We estimate separate models for pirate attacks off the two ports, Berbera and Bosasso. In addition, given the importance of the Saudi ban on Somali livestock that we noted in Section 2, and which is depicted clearly in Figure 1, we also examine the relationship prior to November 2009 separately from the relationship after this date when the ban was lifted. This takes into account the possibility of a statistical regime change taking place as a result of the removal of the ban.

In all models, we include a lag of the dependent variable, as well as year fixed effects. In an effort to control for seasonal effects, we also include a dummy variable for monsoon months to capture whether the month falls in one of Somalia's two monsoon periods.[18] Finally, we include monthly data on the average daily unskilled wage rate for each region, taken from the Food Security and Nutrition Analysis Unit - Somalia (the same source as our livestock data in Figure 1), to account for the possibility that the relationship between piracy and the livestock trade is driven by changes in local labor market opportunities (Jablonski and Oliver, 2012).

The results, which are consistent with our theory, are presented in Table 1. The table shows that in Somaliland, the coefficient for livestock exports is negative whether we look at the whole time period or look separately during and after the Saudi ban. However, the coefficient is more than twice the size in the period after the ban was lifted. The implied effect of a one standard deviation increase in livestock exports is therefore a reduction in the number of pirates attacks by 0.59 per month during the period in which the ban was in place, and by 1.27 per month after the ban was lifted. By contrast, in Puntland the coefficient on livestock exports is closer to zero (or positive).[19]

Estimating the direct relationship between livestock exports and piracy attacks is difficult since many unmeasured factors may affect both export volume and piracy attacks—for example seasonal fluctuations in weather that simultaneously affect both the timing of pirate attacks and livestock exports. In the Supplemental Appendix, we report the results of an estimation strategy that addresses this confounding by using the dates of the Hajj as an instrument for livestock exports.

[18]There are two monsoon seasons in the Gulf of Aden. The summer monsoon occurs from June through August, and the winter monsoon occurs during December through February. Using two separate variables for these two monsoon seasons makes no difference to any of the results in this paper.

[19]The smaller sample size for the Somaliland estimates is due to missing data on the unskilled wage rate. The positive coefficient on exports in Puntland in the period after the ban reflects a noisy relationship and the fact that exports and pirate attacks both increased during this period.

Table 1: Negative Binomial Estimates of Pirate Attacks

DV = Pirate Attacks	*Somaliland* (*Berbera*)			*Puntland* (*Bosaso*)		
	All	During Ban	After Ban	All	During Ban	After Ban
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged Pirate Attacks	0.0536	-0.0581	0.0707	-0.0121	0.00630	-0.229
	(0.0386)	(0.0789)	(0.0446)	(0.0378)	(0.0391)	(0.156)
Exports (log)	-0.241**	-0.273**	-0.580†	-0.0769	-0.0788	0.496
	(0.0762)	(0.0935)	(0.342)	(0.122)	(0.132)	(0.490)
Unskilled Wage Rate	-0.490	0.125	-0.296	-0.285	-0.419	-0.281
	(0.312)	(0.536)	(0.416)	(0.325)	(0.479)	(0.455)
Monsoon	0.200	0.00779	0.479	-0.222	-0.306	-0.159
	(0.224)	(0.295)	(0.329)	(0.204)	(0.231)	(0.453)
Constant	4.999**	3.248*	7.467*	2.202	3.300*	-3.274
	(1.384)	(1.557)	(3.103)	(1.438)	(1.447)	(4.637)
Observations	128	90	38	143	105	38
Pseudo R^2	0.143	0.135	0.108	0.141	0.183	0.038
Log-Likelihood	-175.1	-96.72	-74.20	-201.3	-141.9	-56.51
AIC	388.2	231.4	186.4	440.7	321.8	151.0

Note: Negative binomial estimates of pirate attacks. All models include year fixed effects. Robust standard errors in parentheses. † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

4.2 Piracy and Conflict

We now estimate the relationship between piracy at sea and conflict on land separately for Somaliland and Puntland. To measure conflict in these regions, we use geo-referenced conflict data from the Armed Conflict Location and Event Data Project (ACLED) and generate monthly conflict counts in Somaliland and Puntland from these geo-references (Raleigh et al., 2010). These data are depicted in Figure 3, which plots the cumulative number of violence counts in Somaliland (dotted line) and Puntland (solid line) between 2000 and 2012. During this period, Puntland saw 45% more ACLED-reported conflict incidents overall, experiencing on average eight incidents per month compared to Somaliland's five. This is consistent with our model and qualitative accounts of the on-ground situation in these two regions.

To examine the relationship of interest we take a monthly count of conflict incidents between 2000 and 2012, estimated separately for Puntland and Somaliland, as our dependent variable and a lagged monthly count of pirate attacks within a 250 kilometer radius of the ports of Berbera for Somaliland and Bosaso for Puntland as our main explanatory variable. Lagging this variable enables us to evaluate whether conflict occurs as a result of pirate attacks. As a control, each model also includes a lagged version of the conflict variable to deal with the fact

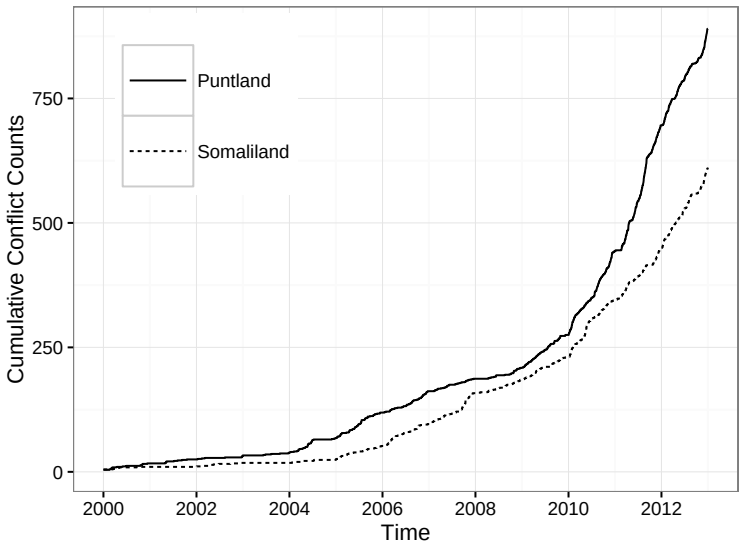

Figure 3. Cumulative counts of ACLED conflict events in Puntland (solid line) and Somaliland (dotted line), 2000-2012.

that conflict instances may be correlated over time. We also include the monsoon dummy and year fixed effects.

Columns (1) and (4) of Table 2 present estimates of negative binomial regression models of the relationship between pirate attacks and conflict in Somaliland and Puntland respectively.Column (4) shows that there is a significant and positive relationship between pirate attacks and conflict in Puntland. Column (1) shows that there is also a positive relationship between piracy and conflict in Somaliland, but it is noisy.[20] Nevertheless, these results are consistent with our theoretical model, which predicts a positive relationship between conflict and piracy in both regions, but greater noise in the relationship in Somaliland.

4.3 Export Price Shocks and Conflict

Columns (2), (3), (5) and (6) in Table 2 also speaks to the role of the livestock economy in the relationship between conflict and piracy. Our theoretical model predicts that a drop in livestock revenue serves as a signal of cheating from the cooperative agreement in place in Somaliland, and hence should increase conflict in that region but not in Puntland, where no such agreement is in place. Columns (2) and (5) explore this possibility by adding local goat

[20] Although the coefficient on pirate attacks in Somaliland is smaller than that in Puntland, we cannot reject the hypothesis that the two coefficients are equal. We note, however, that our measurement of the conflict variable includes incidents that are unrelated to piracy, causing variation in the data over the intensity as well as the nature and causes of conflict incidents. As such, these data are generally very noisy, and the estimates of our standard errors should be interpreted with this in mind.

Table 2: Conflict, Piracy and Meat Prices

DV = Conflict Incidents	*Somaliland*			*Puntland*		
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged Conflict Incidents	0.009	0.00804	0.00914	0.011	0.0111	0.0115
	(0.015)	(0.0140)	(0.0150)	(0.009)	(0.00916)	(0.00957)
Lagged Pirate Attacks	0.038	0.0540	0.0304	0.059**	0.0563*	0.0587*
	(0.039)	(0.0401)	(0.0429)	(0.026)	(0.0264)	(0.0263)
Local Sheep/Goat Price Change		-0.264*			0.0237	
		(0.125)			(0.106)	
Int'l Lamb Price Change			-0.358*			0.0142
			(0.143)			(0.105)
Monsoon	-0.142	-0.193	-0.0638	0.080	0.133	0.0769
	(0.123)	(0.133)	(0.121)	(0.109)	(0.113)	(0.110)
Constant	-0.658	-0.856	-0.691†	0.045	-0.733	0.0448
	(0.418)	(0.555)	(0.379)	(0.283)	(0.519)	(0.282)
Observations	154	125	154	154	136	154
Pseudo R^2	0.282	0.241	0.291	0.238	0.232	0.238
Log-Likelihood	-272.0	-252.8	-268.6	-326.6	-302.7	-326.6
AIC	580.0	539.5	575.1	689.3	641.3	691.2

Note: Negative binomial estimates of conflict instances. All models include year fixed effects. Robust standard errors in parentheses. † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$.

prices to the models estimated in columns (1) and (4). For ease of interpretation, and to capture the effect of substantial price changes, this variable is operationalized as a variable equal to 1 if the month-to-month percent change in price was greater than one standard deviation above the mean, -1 if month-to-month percent change in price was greater than one standard deviation below the mean, and zero otherwise. The data for this variable are again from the Food Security and Nutrition Analysis Unit - Somalia. Missing data require us to truncate the start of the time-series so the number of observations slightly declines after we introduce it to the model. The two columns confirm that a drop in revenue leads to a rise in conflict in Somaliland but not in Puntland.

While drops in local livestock prices may be most relevant signals of cheating in a setting of imperfect monitoring, herders may adjust their market behavior in the face of low prices. This raises the possibility of endogeneity in these estimates. In order to avoid this kind of endogeneity, we also use a source of exogenous variation in international lamb prices from the International Monetary Fund.[21] Specifically, these data refer to the price in US cents per pound of frozen lamb carcasses at London's Smithfield market. Somali livestock herders are price-takers in the international market, so London sheep prices serve as an exogenous source

[21]The data can be accessed at www.imf.org.

of variation in local livestock revenues in Somalia. The idea is that sheep and goats are close substitutes in the world market, so their prices are positively correlated.[22] Thus, the London price data reflect fluctuations in international meat prices and at the same time are unlikely to be affected by the actions of pirates or herders in northern Somalia. We operationalize the international price data in the same way as the local price data: the variable takes a value of 1 if the month-to-month percent change in price was greater than one standard deviation above the mean, -1 if month-to-month percent change in price was greater than one standard deviation below the mean, and zero otherwise. Columns (3) and (6) confirm that major drops in London lamb prices increase conflict in Somaliland but not in Puntland.[23]

Results for both the local and international prices are substantively very similar. As expected, substantial drops in livestock prices are negatively related to conflict in Somaliland.[24] These results provide support for the expectation that conflict in Somaliland occurs at least in part in response to imperfect signals about levels of piracy that traders in Somaliland receive from changes to meat prices. Thus, to provide the pirates with incentives to self-regulate during the high trade season, the traders in Somaliland respond to a drop in prices with conflict in order to provide a deterrent for piracy.

5 Other Explanations

In this section we discuss alternative explanations for our findings and argue that our theory does a better job at explaining the set of empirical patterns.

One popular explanation for the relationship between downward price shocks and conflict, of the kind we see in columns (2) and (3) of Table 3, is the simple theory that says conflict rises when people become poorer as a result of the downward shock to prices. This could be because of labor market effects: when the income from productive activity goes down, criminal occupations involving theft, extortion and fraud become more attractive, leading to greater social conflict. A similar kind of labor market substitution story could also explain why piracy is greater during periods of low trade in Somaliland, as Tables 1 and 2 reveal. Similarly, the fact that conflict is higher in both regions following increases in piracy could be explained by a "resource curse" argument: pirate attacks bring more conspicuous wealth to society, so fighting rises after pirate attacks because there is more to fight over.[25]

[22] For example, we find that the London sheep prices from the IMF are positively correlated with the local Somali goat prices ($\rho = 0.10$ for Somaliland and $\rho = 0.08$ for Puntland).

[23] One estimation strategy that we do not present is that of instrumenting local prices with the international prices, given that they are positively correlated. We instead report the results of the reduced form approach because the local prices are very patchy (making the time series shorter) and because our goal is not to estimate the precise effect of changes in local prices but rather to provide evidence consistent with our mechanism.

[24] At the same time, note that the estimates of the relationship between conflict and piracy in Puntland are unaffected by including price shocks.

[25] Such explanations are investigated by the extant literature on conflict. See, for example, Dal Bó and Dal Bó (2011), Dube and Vargas (2013) and Bazzi and Blattman (2014).

The problem with explanations that rely on labor market effects is that they fail to account for why we see the relationship between piracy and livestock exports, and price shocks and conflict, in Somaliland but not in Puntland. If the livestock trade constitutes a substantial share of the economy in both regions, then shocks to the industry should result in discernible labor market effects in both areas.

More importantly, studies such as Majid (2010), Eid (2014) and Umar and Baulch (2010) stress the importance of clan and family ties in the livestock trade, suggesting that labor markets do not work in the way that the labor market substitution theory posits. In fact, these studies show that herders tend to follow their herds throughout the year, and that the actual shipping business is in the hands of a few specialized traders. Put another way, one does not just quit piracy, buy a herd and start being a herder when short term livestock prices go up. There are considerable fixed costs that prevent this kind of labor market substitution. A more plausible possibility is that pirates are switching between piracy and working as laborers at the ports during the high trade season, but the lack of a significant relationship between piracy and the unskilled wage rate suggests that this is not the case.

Similarly, the resource curse argument fails to account for why the relationship between pirate attacks and conflict is noisier in Somaliland than in Puntland.[26] Moreover, while the resource curse argument may make sense of the relationship between conflict and piracy, its predictions run counter to the pattern we see in the relationship between price shocks and conflict. Downward shocks lower the overall income of society, reducing the aggregate value of wealth that is contestable. Therefore, according to this explanation we should see a positive relationship between steep price drops and conflict in both regions, whereas the relationship is substantially negative in Somaliland and nonexistent in Puntland.

Our model, in contrast to these theories, provides a unified explanation for the data patterns. These data patterns and qualitative evidence that we discussed in the background section suggest that the structure of cooperation between clans is fundamentally different in Somaliland than it is in Puntland. Resource curse and labor market substitution arguments do not take into consideration these social differences, whereas our explanation does. According to our theory, the differences between the two regions are attributable to the fact that clans with diverse interests have discovered a way (albeit imperfect) to cooperate in Somaliland whereas they have not discovered an analogous self-enforcing mode of cooperation in Puntland.

6 Conclusion

We conclude with a few brief comments on the implications of our work, as well as our methodological contributions.

[26] Since there is less conflict overall in Somaliland, the resource curse explanation might posit that the relationship is, if anything, noisier in Puntland.

A key contribution of this paper is to characterize the conditions under which cooperation – like the one that appears to be in place in Somaliland – can be maintained informally through pre-existing social arrangements. In particular, how we address the question of how restraint of predatory economic activities like piracy can be obtained via decentralized social contract in the absence of an exogenous "protector state" – conditions that we see in both Somaliland and Puntland. Our theory suggests that piracy is best controlled by expansion on alternative economic activity like livestock trading, and improving the social and political institutions that promote income-sharing in society.

At the same time, our theory suggests that simply trying to replicate the cooperative social agreement that appears to be in place in Somaliland in Puntland society may not work because of the structural differences between Puntland and Somaliland. In particular, the Somaliland agreement may not be self-enforcing in Puntland due to these structural differences.

From a methodological perspective, our paper demonstrates the value of the theory of cooperation under imperfect monitoring in describing real-world social equilibria. By specifying the theoretical relationship between piracy, livestock trading, and land-based conflict, we were able to generate a number of theoretical predictions that rationalize a set of empirical patterns. This is especially valuable in observational studies in contexts where data are limited. Our modeling approach could be useful in any context where actors switch between cooperative and non-cooperative states based on limited information. More broadly, the approach could be applied to any social phenomena where the actors' preferences change depending on some external state. We leave these explorations to future studies.

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