The Tortuga disease: the perverse effects of illicit foreign capital

The Tortuga Disease: The Perverse Effects of Illicit Foreign Capital[1]

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Abstract

Transnational crime brings substantial foreign capital into a number of fragile and developing states. Yet the economic and political impacts of such capital have rarely been studied due to the challenges of obtaining accurate data on illicit activities. We overcome this challenge by compiling a dataset on the amount and disbursement dates of ransom payments made by ship owners and insurers to Somali pirates from 2005 to 2012, along with sub-national commodity prices and trade flows in Somalia. Using a difference-in-differences strategy, we hypothesize and find that ransoms have effects similar to those associated with the Dutch Disease. These effects include appreciating the local currency, decreasing export competitiveness, and increasing import dependence. The results illuminate a new channel through which illicit capital can undermine long-term economic development and foster an economic and political dependency on illicit sectors.

A sizeable portion of the global economy is both informal and illicit. Yet much international political economy research neglects this illicit side of the global economy despite its potential to distort the licit economy and shape politics.[2] One key reason for this substantial blind spot is the difficulty inherent in connecting the clandestine, illicit side of the global economy with its licit side, much less with politics. A lack of data in particular—what Andreas (2004) refers to as the Achilles Heel of illicit international political economy research—precludes testing even the most straightforward of propositions about the effects of the illicit side of the global economy (Naylor 2004). This is particularly true when attempting to construct reliable estimates of the magnitude of cross-border, illicit flows that result from illicit economic activities.

To further this research agenda, we pose the following questions: Who benefits from substantial inflows of illicit capital? Who loses? While scholars have long been preoccupied with the effects of cross-border capital flows resulting from trade, remittances, or foreign aid, few of them consider the effects of illicit capital flows resulting from illicit economic activities such as the global drug trade, money laundering, human trafficking, or maritime piracy. This theoretical and empirical gap is particularly startling when one considers that the magnitude of illicit flows into some developing states exceeds those resulting from most licit economic activities.

We do three things in this paper to answer these questions. First, we overcome the challenge posed by the clandestine nature of illicit flows by creating an original dataset on ransom payments to Somali pirates and using this to construct estimates of the magnitude of illicit flows

[2] For discussion and evidence, among others, see Hall 2013; Friman 2009; Naím 2010, 2012; Andreas 2004, 2011; Naylor 2004; Grosse 1999; Holmes, Piñeres and Curtin 2008; Thoumi 2002; UNODC 2008; Franco and Godoy 1992.

into Somalia. The dataset consists of all known ransoms paid by ship owners and insurers to Somali pirates from 2005-2012. The public nature of these payments as well as a strong relationship between verifiable vessel characteristics and the size of ransom payments allows us to address concerns about reporting bias with respect to the size of ransom payments and to construct reliable estimates of the magnitude of illicit capital flows into Somalia and the date of disbursement.

Second, we argue and show evidence that illicit capital flows can have effects similar to those associated with the resource curse through Dutch Disease mechanisms: Similar to other forms of foreign capital, illicit capital can appreciate the local currency, decrease income and activity in exporting sectors, and increase income and activity in licit non-tradable and illicit sectors. We argue that if sustained in the long-term, these effects imply that illicit capital can undermine development by weakening trade competitiveness, hollowing out internationally exposed, tradable sectors, and encouraging dependence on the illicit sector. We christen these perverse outcomes the 'Tortuga Disease' after the Dutch Disease and Isla Tortuga—the infamous haven for pirates and their ill-gotten gains during the Golden Age of Piracy in the 17th century.

Third, we test our argument via a quasi-experiment using a difference-in-differences estimation strategy that compares the distributional effects of ransoms on the economies of neighboring regions in northern Somalia—Puntland and Somaliland. Although these two regions were strikingly similar in terms of economic structure and development trends before the rise of piracy, Puntland became the destination for illicit capital flows generated by maritime piracy whereas neighboring Somaliland did not. We further exploit key differences between regions such as the circulation of different currencies in Puntland and Somaliland since the collapse of the central government of Somalia in the early 1990s and sub-national export, import, and commodity price data to test whether illicit capital flows appreciate the local currency, decrease exports, and

increase imports in the corresponding region. We find strong, comparative evidence that ransoms contribute to Tortuga Disease outcomes in Puntland but not in Somaliland.

We make a number of unique contributions. We contribute to the study of illicit flows by overcoming the challenge of a lack of data, constructing reliable estimates of the magnitude of illicit capital flows, and demonstrating their effects. While international organizations and national police agencies regularly collect data and report eye-catching estimates of the magnitude of illicit flows generated from illicit economic activities, the lack of transparency regarding the data and methodology used to construct these estimates as well as the interests of reporting actors in exaggerating the threat posed by such activities raises serious concerns among scholars about reporting bias (Andreas and Greenhill 2011; Thoumi 2005). These concerns subsequently raise doubts about the use of these estimates in testing propositions about illicit flows.

Existing studies have tried to solve this challenge by relying on proxies or instruments for illicit capital flows (e.g. Angrist and Kruger 2008; Fisman and Miguel 2010; Shortland 2011; Walker and Unger 2009). However, we are the first (to our knowledge) to *directly* estimate the magnitude of illicit flows and demonstrate their effects. Consequently, we go to great lengths to detail and establish transparency regarding the data and methodology to construct our estimates.

We also connect literature on the resource curse with the study of illicit flows. The resource curse refers to the puzzle of why states endowed with great natural resource wealth, or high levels of foreign aid or remittances are often unable to capture the benefits that such endowments presumably entail. Yet this literature has largely overlooked how illicit capital flows resulting from illicit economic activity might yield similar effects. For example, while reported estimates of the magnitude of illicit capital flows generated by the global drug trade into drug-producing or trafficking states like Colombia, Burma, Afghanistan, or Guinea-Bissau in recent decades should

be treated with reasoned skepticism, few would dispute that the drug trade resulted in a substantial transfer of wealth.[3] We provide evidence that several of these economies appear to exhibit Dutch Disease-like symptoms.[4] The connection between illicit economic activities and the Dutch Disease has largely ignored perhaps due to the clandestine nature of illicit capital flows. By making this connection, we push forward the study of illicit flows and the resource curse.

We also correct a common misperception about illicit economies in developing states. A substantial inflow of illicit capital may result in an economic boom, the benefits of which may be enjoyed not just by actors engaged in the illicit sector (Angrist and Kugler 2008; Kraska 2010; Shortland 2011; Hanna 2014). Nevertheless, just because one observes evidence that such a boom also benefits actors engaged in a licit sector, one cannot necessarily conclude the long-term developmental consequences are positive overall. We show evidence that while illicit capital may boost consumption and investment, the nature of this consumption and investment may have worrisome effects for long-term development by weakening trade competitiveness, hollowing out internationally exposed, tradable sectors, and encouraging dependence on the illicit sector.

[3] For example, in Colombia, peak coca production was estimated to represent 7-10% of GNP (Thoumi 2002, 2003). Opium was likely Burma's largest export in the 1990s, and, at end-market prices, was valued at over USD 140 billion per year (Dupont 1999). Afghan poppy cultivation may have represented as much as 35% of GNP (Glaze 2007). In Guinea-Bissau, income from drug trafficking may have been greater than the entire licit sector GDP (UNODC 2008).

[4] Illicit capital appears to have to displaced labor, appreciated exchange rates, and inflated prices in several of these economies, with negative developmental consequences (Grosse 1999; Holmes, Piñeres and Curtin 2008; Thoumi 2002; UNODC 2008; Franco and Godoy 1992).

The remainder of the paper proceeds as follows: We begin with a brief discussion of relevant insights from the resource curse literature. Building upon these insights, we elaborate the mechanisms underlying what we term the Tortuga Disease, provide qualitative and comparative evidence, and develop testable implications in the context of Somalia. We then describe our data, outline our empirical strategy, present our results, and address the robustness of those results. We conclude with a discussion of the implications for the study of illicit flows.

2. The Economics of the Resource Curse

The resource curse refers to the puzzle of why states endowed with great natural resource wealth seem unable to capture the benefits that such endowments presumably entail and instead suffer from a range of maladies including but not limited to lower levels of development and democracy, as well as higher inequality, corruption, and conflict (Bourdet and Falck 2006; Dunning 2008; Fearon 2005; Humphreys 2005; Karl 1997; Ross 2012; Sachs and Warner 2001; Younger 1992). The majority of studies evaluate the effects of natural resource production as a source of capital flows and the effects of these flows within recipient states. However, scholars also observe similar symptoms from foreign aid, remittances, and other sources of capital flows (Djankov, Montalvo, and Reynal-Querol 2008; Karl 1997; Resnick and van de Walle 2013; Ross 2012).

Although there are multiple explanations for why capital flows might lead to the resource curse, we focus on the consequences of the Dutch Disease. The Dutch Disease refers to the distributional effects resulting from capital flows into a small, open economy. It predicts that capital flows generated by a sudden boom in a tradable sector will lead to increased consumption and appreciation in the real value of the local currency. Currency appreciation and increased

consumption jointly contribute to a decline in the competitiveness of internationally exposed, tradable sectors (Corden and Neary 1982; Sachs and Warner 2001; van Wijnbergen 1984).

These distributional effects are worrisome for long-term development as they can contribute to the 'hollowing out' of internationally exposed, tradable sectors like manufacturing or agriculture and encourage dependence on booming sectors such as the petroleum or natural gas sector. Volatility in the price of goods produced by booming sectors and dependence leads many states to register lower long-term growth rates, develop large service and small manufacturing sectors, and to experience high levels of inequality (Humphreys et al. 2007; Sachs and Warner 1999, 2001; van der Ploeg 2011). These distributional effects are also linked to a host of adverse political outcomes, including, but not limited to, a greater propensity for civil conflict and corruption (Collier and Hoeffler 2004; Humphreys 2005; Ross 2012).

Yet this literature largely ignores illicit capital flows generated by illicit economic activity as a source of capital flows that can contribute to similar outcomes. However, developing states that host booming illicit sectors exhibit uncanny similarities with states experiencing natural resource production booms. For example, Holmes and Piñeres (2006) note that rising coca production in Colombia in the 1990s corresponded with a booming construction sector, and reduced coffee exports, as well as increasing formal unemployment. Grosse (2001) estimates that the narcotics trade explained over half of the variation in Mexico's black market exchange rate in the 1990s. Thoumi (1995) similarly ties high coca prices in Colombia to rising interest rates and an increasing black market exchange rate, as one would predict if the mechanisms of the Dutch Disease are at play. In one of the few empirical studies of the distributional effects of illicit capital, Angrist and Kugler (2008) show that the price of coca in Colombia drives up self-employment

income—presumably earned by working in the informal, drug-related economy—though they find little evidence this raises the overall standard of living.

A booming illicit sector may also create economic dependency on the illicit economy, with perverse long-term consequences (Hanna 2014; Rubin 2000). For instance, illicit capital from the global drug trade initially was welcomed in Colombia during the 1980s because it brought a real estate boom and a revalued Colombian peso (Holmes, Piñeres and Curtin 2008; Thoumi 1995, 2002). Yet by the 1990s this boom had led to flight of non-drug-related capital, reduced investments, and increased security costs. Expansion of the drug trade also led to the diversion of capital and labor toward criminal enterprise, resulting in lower overall economic growth (Cárdenas 2007).

Besides the contemporary global drug trade, historical instances of the distributional effects of illicit capital flows can be found. For example, the 17th Century pirate haven of Port Royal, Jamaica "had the dubious distinction of being founded entirely on the servicing of the privateers' needs and a highly lucrative trade in prize commodities" (Zahedieh 1986, 216). Craftsmen employed in the non-tradable sector lived better than in England and enjoyed wages three times as high. Also unlike in England's other colonies, currency was so plentiful that it replaced barter as the means of exchange. But Port Royal was dependent on piracy for its prosperity: as one Governor of Port Royal admitted, "scarcely one quarter of what was shipped from [Port Royal] was of its own growth" (Zahedieh 1986, 216). Foreshadowing what we observe in Puntland, planters were harmed by this prize trade because it attracted labor away from agriculture.

In sum, there is reason to believe that illicit capital flows may have distributional effects similar to those described by the Dutch Disease. There are also reasons to believe that if sustained in the long-term, these distributional effects may contribute to a dependency on the illicit sector.

This provides suggestive evidence that illicit capital can contribute to a form of resource curse. However these effects remain, to-date, under-theorized and untested within both the literature on the resource curse as well as the study of illicit flows.

3. The Tortuga Disease: Model & Implications

In this section, we propose a model and mechanisms to explain the distributional effects of illicit capital flows based off of the classic Dutch Disease model. We then develop a series of testable implications for the model in the context of maritime piracy in Somalia.

3.1 The Tortuga Disease Model

Building on Corden and Neary's (1982) classic Dutch Disease model, we consider a small, open economy consisting of three sectors—an illicit sector, a tradable sector, and a third sector that produces a non-tradable good—where the price of goods 'produced' by both the illicit and tradable sectors are set exogenously and productive factors are assumed to be mobile between sectors.[5] We argue that inflows of illicit capital will increase returns to the owners of factors employed in licit non-tradable and illicit sectors, but will decrease returns to the owners of factors employed in internationally exposed, tradable sectors. This has several adverse distributional effects and developmental outcomes. We refer to these outcomes as the Tortuga Disease.

When the illicit sector experiences a shock to production or prices—resulting from either an increase in demand for illicit goods or services or a decrease in the cost of production—this shock will result in a production boom and a corresponding inflow of illicit capital. As a

[5] Other models relax these assumptions. See van der Ploeg (2011) for a review.

consequence, returns to the owners of factors employed in the illicit sector increase. The shock and production boom appreciate the real value of the local currency and alter the allocation of mobile factors amongst sectors through two distinct mechanisms: the *spending effect* and the *resource movement effect*.

The *spending effect* provides one mechanism through which illicit capital creates the conditions associated with the Tortuga Disease. Increasing returns in the illicit sector result in increased consumption and demand for goods and services produced across the economy. As noted in several studies of criminal economies, this consumption will fuel higher wages and investment in both illicit and non-illicit sectors. This spending effect also drives up the real value of the exchange rate as foreign currency is exchanged to pay for increased consumption.

Increased spending on consumption has a differing impact on tradable and non-tradable sectors. While demand for goods and services produced by both sectors increases, only increased demand for non-tradable goods translates into an appreciation in the price of those goods. Increased demand for tradable goods can be offset by increased imports. Therefore the net result of increased spending on consumption is to increase the returns to the owners of factors employed in the non-tradable sector and illicit sector, but not to those employed in the tradable sector. This effect is reinforced by the appreciation of the exchange rate: appreciation undermines the competitiveness of internationally exposed, tradable sectors by increasing the international cost of goods produced for export.

Because of higher returns to the owners of factors employed in the non-tradable and illicit sectors, we also expect the reallocation of mobile factors via the second mechanism underlying the Tortuga Disease—the *resource movement effect*. Since the owners of mobile factors will reallocate these factors to sectors where they promise the highest returns, we should observe a reallocation

of mobile factors away from the tradable sector and towards the illicit and non-tradable sectors. In natural resource producing states this often has the destructive effect of hollowing out sectors in which an economy is globally competitive and increasing investment in the urban service sector. An expansion of an illicit economy should result in a similar realignment of resources towards illicit and service sectors.

What makes the conditions resulting from these two effects worrisome is that they do not necessarily represent a desirable or sustainable shift in economic structure. Since these effects undermine the competitiveness of internationally exposed, tradable sectors, the economy becomes increasingly dependent upon the continued growth of the non-tradable and illicit sectors. In many developing states, tradable sectors such as export-oriented agriculture or manufacturing become less attractive for investment relative to booming sectors. Labor also moves from rural to urban areas as wages in the urban service sector increase relative to wages in rural export sectors. Given the predatory nature of the illicit sector, and its spillover effects on the international economy, the negative externalities from this dependency are much greater than we would expect from a similarly sized resource economy.

To be certain, these distributional effects do not depend upon the 'illicit' nature of capital flows. Nevertheless, illicit capital flows are distinct in how they involve and profit non-state actors which are usually in opposition to legitimate political institutions and actors. This is in sharp contrast to capital flows generated by licit means that lead to the empowerment of the state and that reinforce elite political structures (Jablonski 2014; Licht 2010; Ross 2012; Bermeo 2016). We offer two implications of this distinction.

First, the clandestine nature of illicit activity places illicit capital beyond the easy grasp of the state. This precludes many standard policy options for offsetting the consequences of the Dutch

Disease. For instance, state leaders interested in offsetting the Dutch Disease can direct royalties or taxes on export earnings from natural resource production into productivity boosting investments in disadvantaged sectors. Similarly, leaders can offshore royalties or taxes on export earnings into foreign assets and gradually repatriate the returns, thereby smoothing consumption and investment over time (van Wijnbergen 1984). However, the clandestine nature of illicit capital flows generally places illicit capital beyond the easy grasp of the state and makes such state-led interventions infeasible.[6]

Second, illicit capital flows undermine state control. Unlike firms engaged in licit economic activities, criminal organizations usually lack state protection for their transactions and investments. This often forces them to finance their own militias, or purchase protection through corrupt means (Skaperdas 2001; Volkov 2002). This places criminals in direct competition with the state, leading to an erosion of state control over the economy and territory and the corruption of property rights institutions (Allum and Siebert 2013; Clawson and Lee 1998). For example, in Puntland a considerable portion of income from ransom payments is re-invested into private militias, or paid to local elites for the purpose of protection (World Bank 2013, 63). This appears to undermine state control, particularly in pirate havens such as Eyl and Galkayo.[7] Officials frequently mention their inability to infiltrate these pirate protection networks. To quote the former

[6] For instance, Healy (1985) remarks that while coca production in Bolivia increased rural incomes, it did little for public services because officials could not tax illicit revenues.

[7] The situation may be changing, though in a way consistent with our argument: As ransom payments have declined, donor-funded efforts, such as the Puntland Maritime Police Force, have allowed the government to re-assert control over some pirate havens.

president of Galmudug, "Pirates have more militias, more vehicles and more money than we do. No one can fight them at sea. We need assistance to fight them on land" (Ferguson 2012, 226).

3.2 Hypotheses

Having described the Tortuga Disease model and elaborated its mechanisms, we now turn to developing testable hypotheses from the model in the context of Somalia and the rise of maritime piracy in the mid to late 2000s.

Our analysis will compare autonomous region of Puntland in northern Somalia to its neighbor Somaliland. In the years preceding the rise in piracy, both economies were predominantly dependent upon livestock production and trade. Livestock trade employed approximately 65% of the labor force in Puntland and accounted for an estimated 80% of Puntland's export earnings and an estimated 40% of GDP (Puntland Chamber of Commerce 2013). In Somaliland, livestock represented about 50% of GDP and 80% of foreign currency earnings (Somaliland Ministry of Finance 2013).[8] The remainder of exports in both regions was dominated by frankincense and fish. Almost without exception, exports from both regions leave from the maritime ports of Bosaso and Berbera, respectively, towards Gulf States (Majid 2010). According most indicators, living standards and the pastoral trade were thriving and improving in both states relative to neighboring states prior to our period of analysis (Leeson 2007; Powell et al. 2008).[9]

[8] These data should be taken as indicators only since—with the notable exception of maritime exports—neither government conducts regular census or statistical surveys.

[9] One exception is the decline in livestock exports shortly after Saudi Arabia banned Somali livestock imports from 2000-2009 due to concerns about Rift Valley Fever. The effects of this ban

Both Puntland and Somaliland also have self-governing institutions. Somaliland operates as an unrecognized *de facto* independent state and Puntland as an autonomous region of Somalia. Both have been successful at holding elections and asserting a degree of territorial control, though clans retain considerable de-facto legal authority based upon customary law (Hagmann and Hoehne 2009; Lewis 2008). Both collect the majority of their revenue from trade taxes, and are not financially dependent upon the Transitional Federal Government in Mogadishu (Powell et al. 2008). Both also experienced comparative stability relative to southern Somalia prior to the period under study (*ibid.*).

Beginning in the mid-2000s, pirate groups began hijacking a considerable number of vessels transiting the Gulf of Aden. It is important for our analysis that all of these pirate groups were operational in the Puntland region or immediately adjacent to it (World Bank 2013, 31; United Nations 2011, 37-41). No pirate groups operated out of the territory claimed by Somaliland. The bulk of investments from pirate financiers also remain in Puntland (World Bank 2013, 60; Shortland 2012).[10] However, while ransoms remain in Puntland, the attacks occur throughout the greater Gulf of Aden and Western Indian Ocean (Figure 1).

[Figure 1 about here]

were not as significant during our analysis period since Somali traders found alternative routes through Yemen (Majid 2010).

[10] Some sources record pirate activity near the southern ports of Kismayo and Merka; however analysis by Shortland and Varese (2014) confirms that these were not acts of piracy but actions taken by officials and clans to capture licensing fees (in Kismayo) or protection money (in Merka).

Ransoms represented one of the largest sources of capital flows into Puntland. We calculate that ransom payments to pirates totaled USD 163 million in 2011, the year in which ransom earnings peaked. In contrast, we estimate that livestock exports through the Bosaso port totaled USD 113 million in 2011. Piracy was undeniably a principal driver of economic activity for the region. To illustrate this fact, in Figure 2 we plot monthly earnings from ransom payments relative to monthly export earnings.

[Figure 2 about here]

Figure 1: Map of Somali Hijackings (2005-2012)

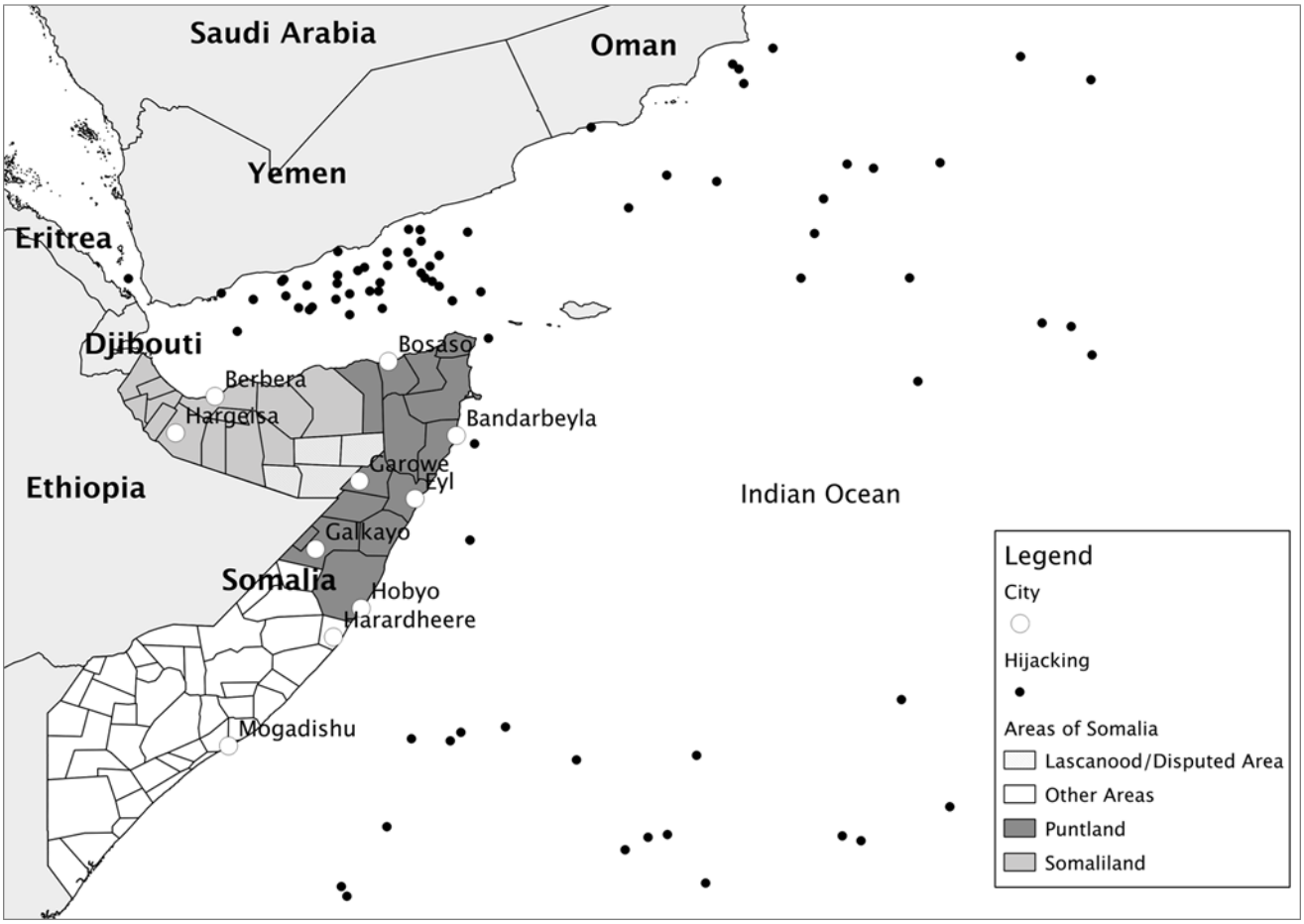
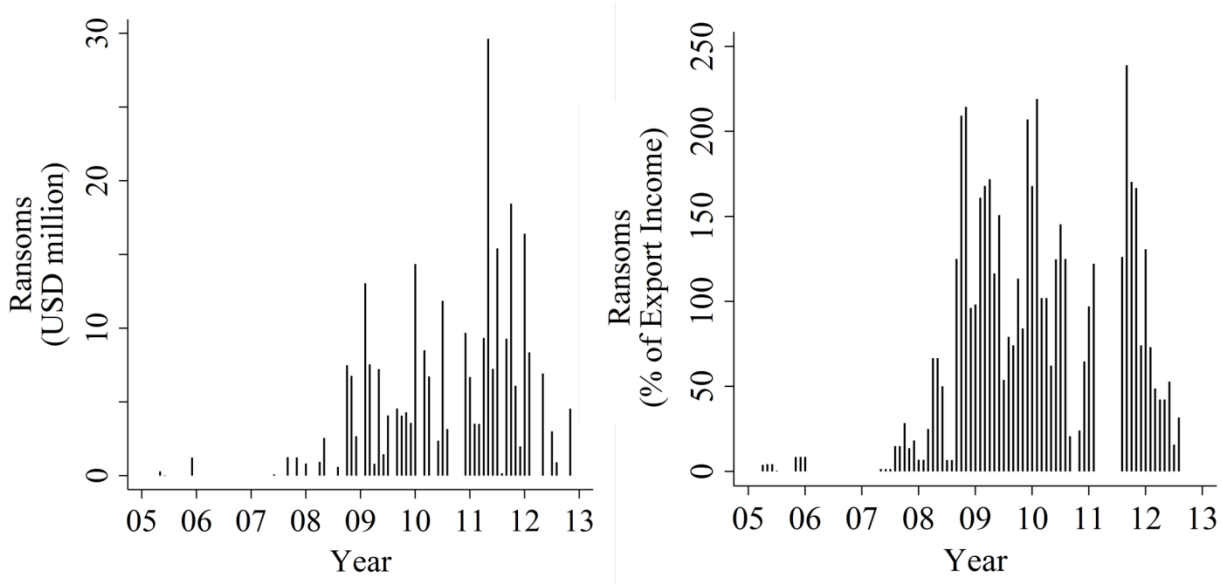


Figure 2: Ransom Payments in Puntland (2005-2012)



The left axis shows the monthly value of ransoms from 2005 to 2012. The right axis shows the monthly value of ransoms as a percentage of Puntland's monthly livestock export income (authors).

Literature on maritime piracy has yet to go into depth on piracy's economic effects within states that play host to pirate groups and instead focuses on the causes of different types of piracy (Axbard 2016; Daxecker and Prins 2013; de Groot, Rablen, and Shortland 2011; Flückiger and Ludwig 2015; Guilfoyle 2010; Hansen 2009; Hastings 2009, 2012; Jablonski and Oliver 2013; Percy and Shortland 2013; Shortland and Varese 2014). However, there are reasons to think that Somali piracy has broad effects on development. In one of the few studies on piracy's economic effects in Somalia, Shortland (2012) argues that piracy has positive effects for development: Using market prices and luminosity data, Shortland (2012) suggests that piracy has had a positive impact for many groups within Puntland, boosting investment in real estate and consumption, particularly among the working poor and pastoralists. Kraska (2010) comes to similar conclusions, arguing that piracy fuels investment and contributes to resurgence in the fisheries sector. While we agree that evidence suggests that piracy has stimulated increased consumption and investment, we question whether consumption and investment fuelled by illicit capital flows—much like that fuelled by earnings from resource production—is necessarily positive for long-term development.

Accounts of ransom payments to Somali pirates report that ransoms are paid in foreign currency, usually U.S. Dollars, via drops from the air immediately prior to the release of hijacked vessels. Reports from Somalia provide descriptive evidence that supports the operation of both the spending effect and the resource movement effect following ransom payments. Pirates spend much of their ransom money on consumption of imported goods or non-tradable services, and invest in current and future piracy operations. Operational investment includes purchases or upkeep for skiffs, engines, boarding equipment, weapons, car rental, fuel for the cars and any needed electrical generators, communications and money to pay off local political elites. Documented consumption

investments include purchases of houses, food, alcohol, the narcotic *khat*, cars, 'travelling' wives and the spending necessary to support them (World Bank 2013, 45-50, 59-67; Bahadur 2011).

Consistent with the spending effect, this spending of ransom payments appears to cause inflation. The mayor of Bandarbeyla, a town on the northeastern coast of Puntland, claimed in 2011 that food prices had "skyrocketed" due to increased consumption fueled by ransom payments (Ismail 2011). Media reports further indicated that pirate attacks drove up prices of fuel. Merchants in Eyl also complained about the inflationary effects of ransoms (Bahadur 2011, 176-177, 184): Food was more expensive, and the narcotic *khat* sold for twice the unit cost in Eyl as elsewhere ("Division of" 2011; Shortland 2012, 4). Similarly in Galkayo, residents complained about currency appreciation following ransom payments (Fergusson 2013, 233).

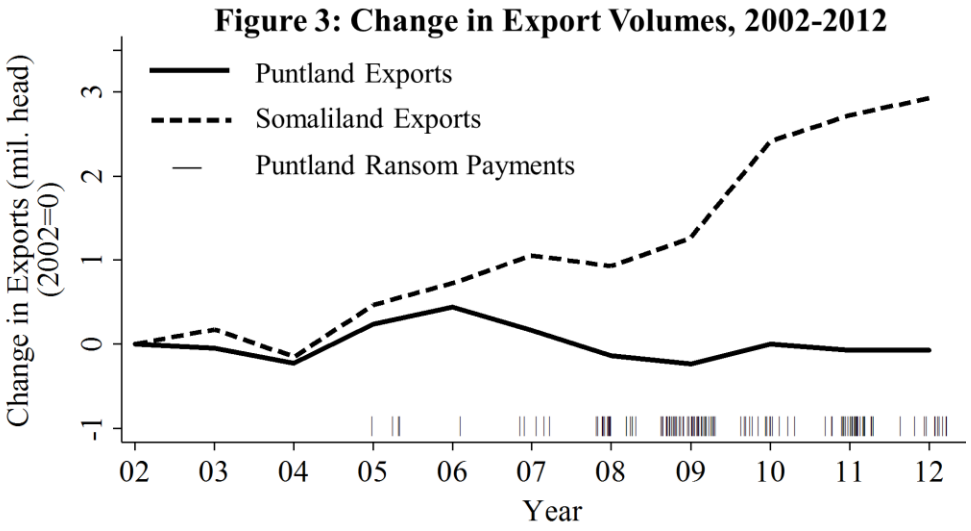
Consistent with the resource movement effect, piracy also resulted in an increase in non-pastoral employment. This resulted both from the direct hiring activity of pirates, as well as from investment spillovers. Pirates directly employ – in addition to financiers and hijackers –cooks, messengers, translators, negotiators, accountants, and guards to support their operations (Hansen 2009; Shortland and Varese 2012; World Bank 2013, 45-47). Pirates and those in their employ also support those in the non-tradable service sectors. Pirates spend money on guards, construction workers, 'travelling wives', *khat* suppliers, auto importers, and shops involved in the sale of provisions. Consistent with a boom in the services sector, there are several accounts of youth choosing to work in towns with or for pirates rather than pursue pastoral employment and fishing (Bile 2013; PDRC 2010). As one elder noted during the peak of pirate activity in 2010, "There is widespread poverty…youth abandon the nomadic lifestyle and flock to towns and villages…they only want to live by any means available to them…before you tell them this is wrong or right they may already have become thugs" (PDRC 2010). A 2010 United Nations Development Program

interview with business and government authorities also confirms a general trend away from livestock employment after 2005 (UNDP 2011).

To further evaluate this shift in Figure 3 we plot the change in Puntland's exports relative to Puntland's self-governing neighbor Somaliland. While Somaliland and Puntland's exports closely track each other prior to the rise in piracy, Puntland's exports declined considerably relative to Somaliland, and other neighboring ports, after 2005.[11] While we cannot conclude from these data alone that the Tortuga Disease underlies these effects, piracy appears to have taken a sharp toll on Puntland's exports. If Puntland's exports had continued to grow at the same rate as Somaliland's, Puntland's economy would have seen an additional USD 580 million from (licit) capital flows from 2005-2012, or more than double what it actually earned (FSNAU 2014; authors).

[Figure 3 about here]

[11] Livestock exports from neighboring ports in Ethiopia and Djibouti expanded at a similar rate to Somaliland during this period (Ethiopia Ministry of Finance 2011; Majid 2010)



Horizontal lines show the yearly volume of maritime exports (in millions of heads of cattle, sheep, goats and camels) exported from Puntland and Somaliland relative to exports in 2002. The vertical lines show the density of ransom payments in each year.

Ransom revenues appear to largely fuel investment in services, real estate, finance or criminal sectors. Little appears to go into pastoral or export sectors. The World Bank (2013, 59-63) tracked investments made by 59 pirate financiers. While non-representative, this provides an indicative measure of how ransom revenue was redistributed. The survey found that only 12% of financiers invested in trade, and only 3% invested in trade within Puntland. The majority of investment instead went to developing political influence or militias (32% of financiers),[12] followed by real estate (31% of financiers) and transportation, largely for criminal activity (25%).

[12] Respondents could be invested in more than category at the same time, and the overall breakdown of investors from Puntland versus elsewhere in Somalia was not given in the report.

Investments specifically in Puntland were even more likely to fund militias, political influence, smuggling or transportation.

In terms of testable hypotheses, the Tortuga Disease model implies that the sudden introduction of large amounts of illicit capital into a small, open economy like Somalia should appreciate the real value of the local currency, particularly after foreign currency is exchanged locally to pay for increased consumption of goods and services as described above.

H1: An increase in illicit capita flows from ransom payments will cause the local currency to appreciate in real terms.

Illicit capital from ransoms payments will also undermine internationally exposed, tradable sectors by decreasing revenue from exports and shifting mobile factors out of these sectors and into the illicit and non-tradable sectors. The export of cattle, camels, sheep and goats through ports in northern Somalia to markets in the Arabian Peninsula represents Somalia's top single source of (licit) capital flows aside from perhaps remittances (Little 2008, 147-50). We should therefore expect an effect of ransom payments on livestock exports in areas where ransoms are distributed.

H2: An increase in illicit capital flows from ransom payments will cause a decrease in exports.

Yet while illicit capital from ransoms payments should decrease exports, we expect an opposite effect on imports. As the local currency appreciates and tradable sectors decline, imports will become relatively cheaper and more attractive, particularly as income from ransom payments is spent on imported goods. As a result, we expect an overall increase in imports.

H3: An increase in illicit capital flows from ransom payments will cause an increase in imports.

Altogether, these hypotheses imply that the inflow of illicit capital harms internationally exposed, tradable sectors of the economy and increases import dependence. While illicit capital may boost consumption and investment, the nature of this consumption and investment may have worrisome effects for long-term development by weakening trade competitiveness, hollowing out internationally exposed, tradable sectors, and encouraging dependence on the illicit sector.

4. Data & Empirical Strategy

To test these hypotheses, we applied a differences-in-differences strategy to a unique dataset of Somali pirate attacks and ransom payments in order to compare the effects of illicit capital inflows on Puntland's economy relative to Somaliland's economy.

4.1 Data

We collected an original dataset containing information on all known hijackings for ransom of oceangoing vessels by Somali pirates between 2005 and 2012. For each incident, these data include the date the vessel was captured, the date the vessel was released, the date the ransom was disbursed by ship owners or insurers, and the reported amount of the ransom in US dollars.

These data are coded from multiple sources, including official naval press releases, newspaper reports, maritime newsletters, and International Maritime Organization (IMO) circulars. This was a challenging task, one we describe fully in the online appendices. One challenge is that parties involved in ransom negotiations may have incentives to mislead: Ship owners and insurers may want to under-report the size ransom payments. Pirates may over-report in order to drive up the value of future payments. Additionally, journalists often rely on second-hand sources that may either over-report or under-report. Furthermore, journalists faced with a

range of reported ransom payments have incentives to select the most eye-catching numbers, thereby contributing to over-reporting of the size of ransom payments.

We address these challenges in several ways. First, every effort was made to verify ransom details from multiple sources. Where sources disagree, we rely on the most authoritative or recent source. Second, in the appendices we cross-validate our data with data from several similar coding efforts. Third, and most importantly we address potential reporting bias as an estimation problem. Following Ashenfelter and Krueger (1994), we instrument for reported ransom payments using the verifiable characteristics of hijacked vessels, including the vessel type, flag country, and tonnage. By predicting ransom payments from vessel characteristics that reflect the value of the vessel and the ransom payment that can be demanded, we can isolate this systematic effect, filtering out reporting bias. This also helps rule out potential reverse causation and omitted variable bias since these ship characteristics are plausibly independent of the economy of Puntland. We further detail our approach in the appendices.

To test our hypotheses, we also require information on exchange rates, exports, imports, and commodity prices for Somaliland and Puntland. For commodity prices and exchange rates we rely on data from the UN Food and Agriculture Organization's Food Security and Nutrition Analysis Unit - Somalia (FSNAU 2014). These price and exchange rate data were collected by FSNAU enumerators who visit markets throughout Somalia in order to track monthly changes in prices and exchange rates.[13] Since there is no central government bank or exchange in Somaliland,

[13] We took steps to validate FSNAU's methodology. While there are few other independent sources, FSNAU's numbers align with official data from the Puntland Ministry of Planning and International Cooperation (MOPIC 2003). We also conducted field interviews with FSNAU staff

Mogadishu or Puntland, this is the most reliable source for these data and has the advantage of allowing us to measure exchange rates and prices at the market-level and in areas where ransoms are likely to have the greatest impact.

Using these market data, we calculate the average monthly exchange rates for the Somaliland shilling in markets across Somaliland. We also calculate the average monthly exchange rates for the Somali shilling in markets across Puntland. In order to adjust for price inflation during this period we have to convert these nominal exchange rates to real exchange rates using a consumer price index (CPI) developed by FSNAU. We discuss this calculation in the appendices. With these real exchange rates, we create a variable, $Log(Exchange\ Rate)_{it}$ which equals the real exchange rate of each currency with the U.S. Dollar in month *t* for region *i*. For the Puntland region, this variable represents the number of dollars required to purchase a Somali Shilling in Puntland markets. For the Somaliland region, this variable represents the number of dollars required to purchase a Somaliland Shilling in Somaliland markets.

Our data on import and export volumes originate from the Port Authorities of Berbera and Bosaso, the maritime ports of Somaliland and Puntland, respectively (FSNAU 2014). These are the main exit points for livestock headed towards international markets and the main entry points for imported goods.[14] We multiply these export volumes by the average export price of each

in Nairobi to validate their methodology. In most cases, these data are collected across multiple markets, and we average the prices within each region.

[14] The majority of exports leave from these ports towards the Middle East during this period (UNDP 2011). Since we cannot capture trade overland, we may underestimate overall exports;

livestock type in local markets as determined by FSNAU enumerators. Using these data, we create a variable, $Log(Exports)_{it}$, which equals the value (normalized to U.S. Dollars in 2000) of cattle, camel, sheep and goat exports from each port.

We also create a variable, $Log(Imports)_{it}$. This equals the import volumes of sugar, wheat and rice imports multiplied by the value of these imports in local markets as determined by FSNAU enumerators. While these are three of the most imported commodities into Somalia; unfortunately we lack data on non-food imports, such as fuel. This suggests that we likely underestimate the overall effect of ransoms on imports. We show summary information and temporal trends for all our independent variables in Figure A1 in the appendices.

4.2 Empirical Strategy

Estimating the effect of ransom payments is challenging due to the fact that piracy is influenced by broader trends in the Somali economy, such as unemployment, shipping and commodity prices (Jablonski and Oliver 2013; Besley, Fetzer and Mueller 2015; Guilfoyle 2010). Since these trends likely have independent effects on exchange rates and trade, a simple regression of exchange rates, exports and imports on ransom payments could simply indicate reverse causality or omitted variable bias. In addition, piracy itself likely affects Somalia's trading activity since piracy could deter vessels from entering Somali ports.

We use several strategies to address such concerns. First we use a difference-in-differences estimation strategy. This is an attempt to isolate the economic effects of ransom payments by

however since Somalia's neighbors are also livestock exporting economies, there are few cost-effect opportunities to substitute maritime trade for overland routes.

subtracting the effect of ransoms on periods and regions where we expect ransoms to impact the local economy—namely in Puntland after a ransom payment—from periods and regions in Somalia for which we do not expect to observe these impacts.

This strategy allows us to rule out many alternative explanations since most factors that might confound our estimates will affect the whole of Somalia rather than Puntland specifically. For instance, pirate attacks deter ships from entering Somali waters; so any observed effect of ransom payment on trade might be spurious. Also both exports and ransoms could be seasonally dependent and so might be correlated in ways that introduce bias. However, since the effect of ransoms on trade should largely be isolated to locations where ransom funds are actually spent, we can remove the effect of piracy on trade volumes and reduce any seasonal dependence by subtracting the average effect of ransoms on trade within areas in Somalia where ransoms are not spent from areas where ransoms are spent.[15]

The crucial assumption underlying difference-in-differences estimation is that the comparison cases follow equivalent trends, meaning that trade and exchange rates should adjust to outside events in similar ways across the two cases.

A natural comparison case is Puntland's self-governing neighbor, Somaliland. As discussed earlier, there are intuitive and empirical reasons to believe that Somaliland and Puntland should have similar economic trends. They share the same geography and have similar economies

[15] This assumes that the spillover of ransom money outside Puntland is minimal, at least in the short-run. Most accounts suggest a considerable portion of ransom income remains within the region (World Bank 2014), and so we do not anticipate significant bias. Spillover would likely result in an underestimate of treatment effects.

and governments. Trends in their economies appear to be equivalently influenced by outside events, such climatic shocks or trends in livestock demand. To provide empirical support for our equivalent trends assumption, we plot trends our outcome variables in Figures A2-A5 in the appendices.

Why do pirates operate from Puntland and not Somaliland? One explanation is differences in institutional capacity (Hagmann and Hoehne 2009; Lewis 2008; Do 2013, 136-142). In 2008, Puntland faced a financial crisis that undermined its ability to pay security forces. The resulting security vacuum helped pirates establish an operational base in Puntland (Jablonski and Oliver 2013; Hansen 2009). Colonial history may also have contributed to these differences. Somaliland was a British protectorate and enjoyed indirect rule until Somalia's independence. When Mussolini violently asserted direct control over the region (including Puntland) in the 1920s, he excluded traditional elites and undermined pre-existing institutions, probably hindering efforts to rebuild state institutions after the fall of the Barre government in 1991 (Prunier 2010). Somaliland's ability and willingness to deter pirates may have also been partly due to its greater ability to grant elites access to drivers of economic development, a national ideology that identified Somaliland as the crime-free territory in the Horn of Africa, and its greater reliance on trade taxes (Phillips 2013; Shortland and Varese 2014; Hastings and Phillips 2016).

Our difference-in-differences strategy is helped by the fact that Puntland and Somaliland rely on separate free-floating currencies.[16] Like southern Somalia, Puntland relies on the Somali shilling. Somaliland, however, relies on the Somaliland shilling and prohibits the use of the Somali

[16] The Somaliland shilling was originally fixed to the dollar, but was later floated in 2002 in response to concerns over currency reserves (Mubarak 1997; "A Sudden" 2002).

shilling in its territories (Mubarak 2002). This unique feature of the Somali economy is due to the attempt by the Somaliland government to declare independence in 1994 and forge a separate national identity (although so far without international recognition). We show in the appendix that both currencies follow similar trends, especially prior to the expansion in pirate activity and as one would expect given the similarity in the economies. So, despite both being nominally part of the same state, both Puntland and Somaliland rely on separate, floating currencies. This fact allows us to use the Somaliland Shilling as a comparison in order to estimate effect of ransoms on the price of the Somali Shilling in Puntland.

One might still worry about reverse causation: the economic problems of Puntland, or of Somalia in general, may have played a role in the decision of individuals to turn to piracy and seek out ransoms. If underdevelopment in general does cause piracy ransoms to rise, an economic downturn should cause all sectors of the economy to become depressed even as ransoms increase. Yet if our causal story is correct, as pirate attacks and ransoms increase, there should be varying effects in different parts of the economy, as exports decline, and imports, consumer goods consumption, and construction activities increase after ransom payments. This is in fact what we find, as reported below. Nonetheless, we address the possibility of reverse causation and endogeneity in several ways. First, the differences-in-differences strategy itself allows us to see differences in the changes over time within Somaliland and Puntland, which rules out economic shocks across all of Somalia as drivers of any patterns we find.

Second, we rule out reverse causation concerns by taking advantage of the fact that most confounding variables are related to the rate of pirate attacks, rather than to the size or date of ransom payments. Ransom payments are only received after months of negotiation following an attack. So by controlling for trends in attacks we can rule out many alternative explanations. For

example, any effect of the economy on piracy is likely going to influence the rate of pirate attacks but is unlikely to influence the date of payment, which is plausibly exogenous. Nor is it likely to influence the size of a ransom payment, which – as we demonstrate – can be reliably predicted from exogenous ship characteristics. Similarly, any effect of institutional capacity on piracy is likely to due to an inability to mount attacks in the face of increased state security; however there is little reason to believe that institutional capacity would affect size or timing of ransom payments. Data on attacks come from the International Maritime Organization circulars as coded by the authors.

We estimate our differences-in-differences problem using a regression framework with the region-month as the relevant unit of observation. We create a variable, $Log(Ransom)_t$, which is equals the value of ransom payments in month *t*. Since it is not necessarily reasonable to assume that ransoms impact the economy in the same month in which a ransom payment is received (particularly when received towards the end of a month), we also estimate our models using a one month lag of *Log(Ransom)*. We find that the largest impact of ransom payments occurs within a couple months, though the effects often persist for longer. In the appendix we also consider more complex lag specifications and first differences.

We create a dummy variable, *Puntland*, which equals one for exports, imports, and exchange rates out of Puntland and zero for values out of Somaliland. Let $Log(Y)_{it}$ be the log of exchange rates, exports, imports. We represent our estimation problem as follows:

$$Log(Y)_{it} = \theta_{DD} Puntland_i * Log(Ransom)_t + \beta Log(Ransom)_t + \varphi X_{it} + \gamma_i + \delta_t + \epsilon_{it}$$

Where γ_i are the state fixed effects and δ_t are month fixed effects. The coefficient of interest, θ_{DD}, provides the effect of ransoms on exports, imports, or exchange rates in Puntland after subtracting the effect of ransoms on exports, imports, and exchange rates in Somaliland. Thus

θ_{DD} provides an estimate of the extent to which ransoms affect the Puntland economy. All our models are estimated with robust standard errors.

We include a vector of controls, X_{it}, to account for confounds. One challenge is that piracy may affect exports through other channels. For example, pirate attacks deter ships from entering Somali waters. Since ransom payments often occur months after the actual attack, and we control for the rate of attacks this seems unlikely. However, to account for this possibility we include controls for the monthly total number of attempted attacks off Somalia (Jablonski and Oliver 2013), and the number of ships transiting the Suez Canal (Suez Canal Authority 2014). We also include a control for Somalia's GDP growth in order to account for overall trends in the Somali economy (United Nations 2013). We include a dummy variable for the South Asian monsoon season (Cornell 2002), since monsoons influence the ability of pirates to carry out attacks. We include a dummy variable for Ramadan since this holiday correlates with higher livestock demand in the Arabian Peninsula. We include a dummy variable for a Saudi ban on Somali livestock from 2000-2009.[17] We include a dummy variable for the deployment of the Puntland Maritime Police Force in 2012. This was a donor-funded policing effort that played a role in securing several coastal towns against piracy ("Puntland Forces" 2012). Later we discuss several additional specifications.

Our outcomes likely also trend over time in unmeasured ways. As Angrist and Pischke (2009) point out, difference-in-differences estimates can underestimate standard errors when serial correlation exists within treatment groups. Common solutions, such as clustering and bootstrapping are unlikely to solve this potential problem since the number of groups in our

[17] Prompted by Rift Valley Fever concerns, Saudi Arabia banned livestock imports from the Horn of Africa from 2000-2009.

analysis is small (Wooldridge 2003). Instead we include an AR(1) correction and report Durbin Watson statistics in all tables.[18]

Yet we recognize that the assumption of equivalence is difficult to verify (Abadie, Diamond, and Hainmueller 2010). Also an AR(1) specification can be problematic in the presence of fixed-effects (Angrist and Pischke 2009) and any spillover effects of ransoms on Somaliland might bias our estimates downward.[19] To verify the robustness of our difference-in-difference specification to alternative assumptions, we estimate separate regressions for Puntland and Somaliland:

$$Log(Y_{SL})_t = \theta_{SL} Log(Ransom)_t + \varphi X_t \ + \ \delta_t + \epsilon_t$$

$$Log(Y_{PL})_t = \theta_{PL} Log(Ransom)_t + \varphi X_t \ + \ \delta_t + \epsilon_t$$

The coefficient θ_{PL} gives us an estimate of the effect of ransoms on Puntland's exchange rates, exports, and imports. The coefficient θ_{SL} gives us an estimate of the effect of ransoms on Somaliland exchange rates, exports and imports. This Somaliland coefficient acts as an placebo effect estimate: if ransoms affect these outcomes only through our proposed mechanisms, the effect of ransoms on Somaliland, θ_{SL}, should be small or insignificant. We include the same vector of control variables, *X*, along with robust standard errors and an AR(1) correction.

[18] The AR(1) is criticized by Bertrand et al. (2009) as insufficient with short time series. Because we rely on a longer series and only two groups, an AR(1) should be sufficient. Durbin Watson statistics suggest this to be the case; however we also use alternative specifications. Our results are also consistent with an AR(2) specification.

[19] Note spillover effects would make us less likely to observe a significant effect of ransoms.

5. Results & Robustness Tests

In this section, we report our main results and describe a series of robustness tests designed to address potential concerns with our results. First, we report our main results that show consistent support for our argument. Second, we describe the robustness tests and their results..

5.1 Main Results

Our first hypothesis (H1) is that ransoms will cause an increase in demand, driving up the real exchange rate in Puntland. In Table 1 we look at the effect of ransoms on *Log(Exchange Rate)*. The results shown in Table 1 and Figure 4 are consistent with H1. In the short-term (Model 1), the effect is positive, but not significant. This is not surprising as ransom money may not enter the economy immediately. If we allow for a delay in disbursement of ransoms by one month, ransoms have significant positive effects on the exchange rate (Model 2).[27] These results imply that over time the inflows of illicit capital into the Puntland economy appreciate the real value of the Somali Shilling. Consistent with our argument, there is no significant effect of ransoms on the Somaliland Shilling (Model 4).

As Figure 4 illustrates, these effects are substantial. In real terms, our estimates suggest that a 9.5 million dollar ransom (equivalent to the *Samho Dream* supertanker ransom in 2010) would appreciate the real value of Puntland's currency relative to the U.S. dollar in Puntland by

[27] In the appendix we assess the timing of these effects in more detail by estimating these effects with more complex lag specifications.

11 percent on average.[28] As shown in Models 1 and 2, and consistent with our assumption that ransom payments do not affect Somaliland, ransoms do not appear to appreciate the Somaliland Shilling. Nor do these effects appear to be driven by biases in reported ransom amounts: As shown in Model 5, our results remain consistent when we instrument for ransom amounts using data on vessel characteristics.

[Table 1 about here]

[Figure 4 about here]

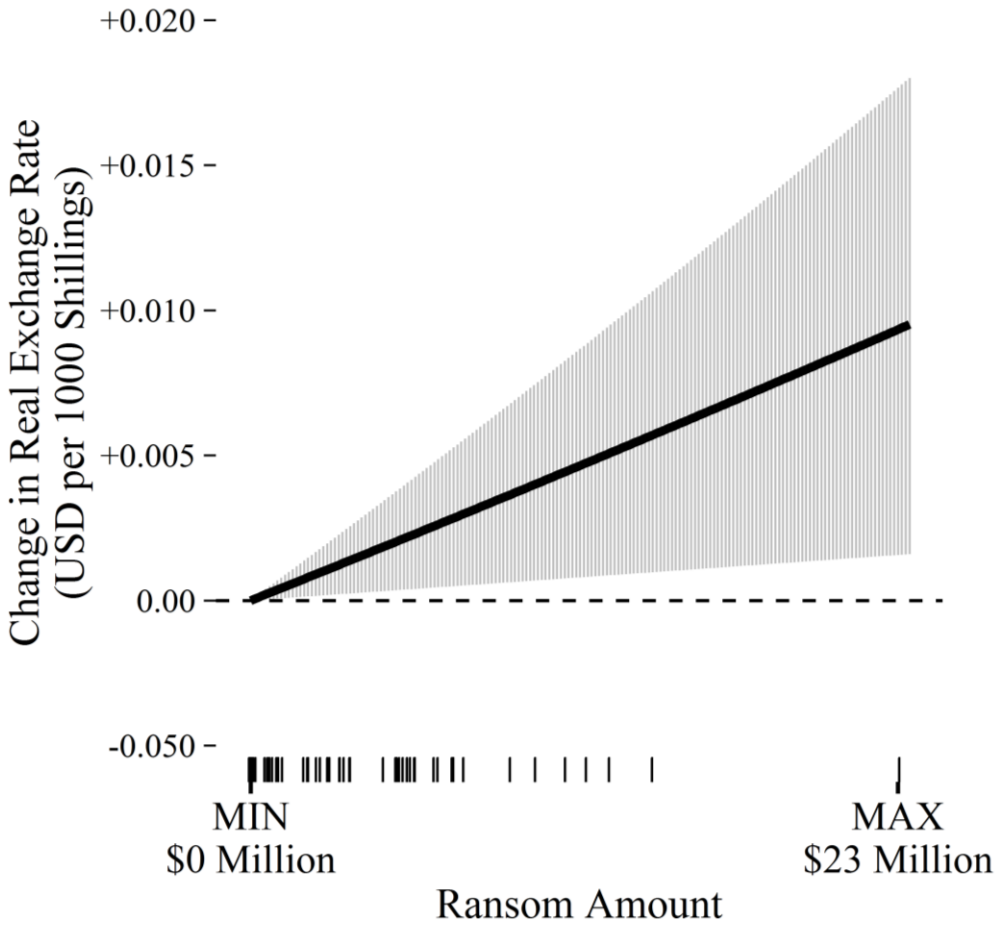
[28] Relative to the mean exchange rate of 0.073 dollars per 1,000 shillings.

Table 1: The Effect of Ransoms on Exchange Rates

	(1) Diff-in-Diff	(2) Diff-in-Diff	(3) Puntland	(4) Somaliland	(5) IV Puntland
Log(Ransom)*Puntland	0.0015				
	0.0023				
$Log(Ransom)_{t-1}$*Puntland		0.004**			
		0.002			
Log(Ransom)	-0.002				
	0.002				
$Log(Ransom)_{t-1}$		-0.00004	0.004**	-0.0001	0.004**
		0.001	0.002	0.001	0.002
Puntland	-1.225***	-1.285***			
	0.179	0.164			
Log(Pirate Attacks)	0.0001	-0.0001	-0.013	0.019	0.006
	0.011	0.010	0.014	0.015	0.012
Log(Shipping)	-0.412	-0.445*	-0.504*	-0.536	-0.083
	0.254	0.238	0.255	0.387	0.169
Monsoon	-0.075	-0.070	-0.143**	0.006	-0.060
	0.053	0.049	0.065	0.059	0.043
GDP Growth	0.001	0.001	-0.001	0.002	0.0005
	0.001	0.001	0.001	0.002	0.0007
Ramadan	0.061**	0.062**	0.050	0.075**	0.051
	0.027	0.027	0.041	0.036	0.041
Saudi Livestock Ban	-0.031	-0.031	-0.115**	0.009	-0.119**
	0.039	0.038	0.052	0.050	0.051
Maritime Police Force	0.200	0.205	0.327**	0.159	0.135*
	0.226	0.220	0.149	0.388	0.071
$Log(Exchange)_{t-1}$					0.564***
					0.094
Observations	190	188	94	94	93
R-squared	0.54	0.583	0.788	0.388	0.854
Durbin-Watson Statistic	2.5	2.4	2.1	2.5	

*significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors in parentheses adjusted for autocorrelation. Included but not shown are month fixed effects.

Figure 5: The Effect of Ransoms on Exchange Rates



This figure shows estimates of the effect of ransoms on Puntland's real exchange rates with the US dollar (USD per 1,000 Somali Shillings). The shaded area shows the 95% confidence interval. Predictions are from Table 1 Model 2.

Because of the currency appreciation and the shift of mobile factors out of tradable sectors, we hypothesize that ransoms will also reduce exports from Puntland. In Table 2 and Figure 5 we show the effect of ransoms on *Log(Exports)*. Consistent with H2, ransom payments appear to decrease exports (Model 1). These effects appear to be driven by ransom payments in Puntland rather than broader trends in the Somali economy. As shown in the difference-in-differences results (Models 1 and 2), there is little, if any, negative effect of ransoms on exports from Somaliland. Nor do these effects appear to be driven by biases in reported ransom amounts: our results remain consistent when we instrument for ransoms (Model 5).

As shown in Figure 5, we estimate that a USD 9.5 million ransom would reduce exports from Puntland by nearly USD 1 million per month. Considering that the monthly average level of exports from Bosaso is only about USD 4 million, this represents a considerable impact on Puntland's pastoral economy.

[Table 2 about here]

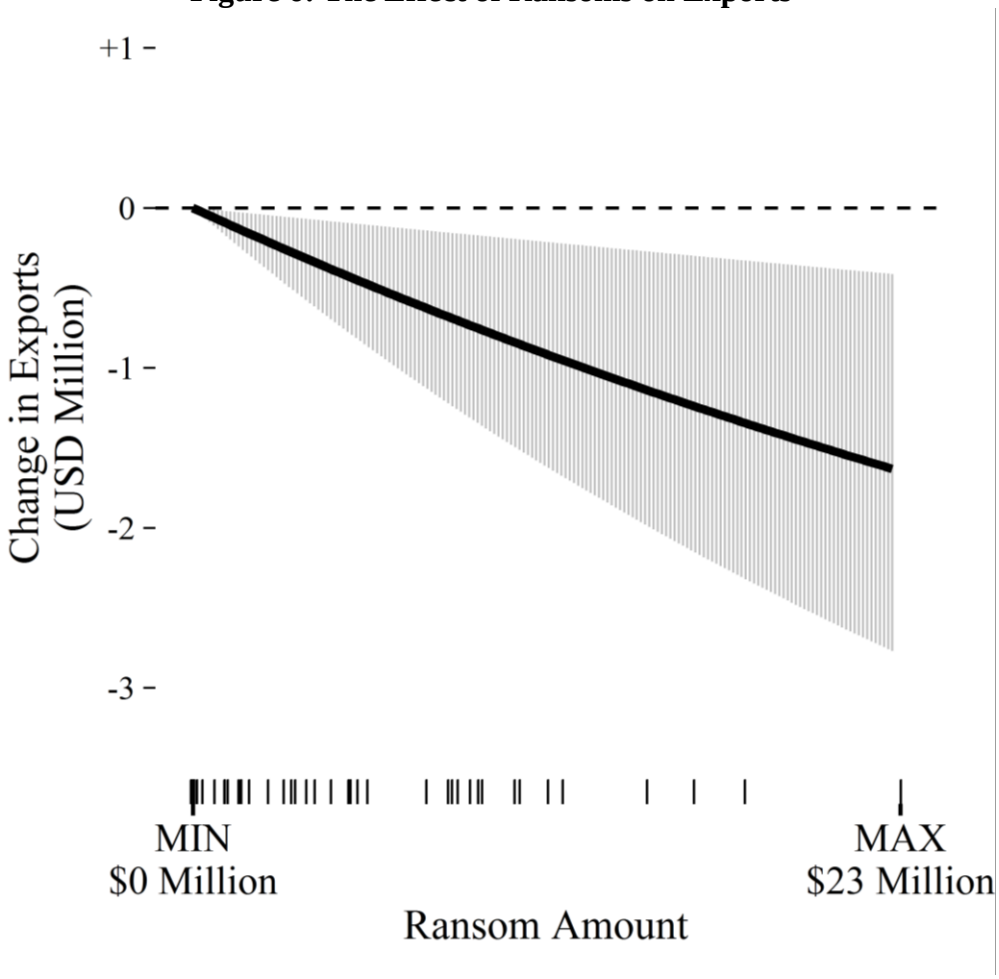
[Figure 5 about here]

Table 2: The Effect of Ransoms on Exports

	(1) Diff-in-Diff	(2) Diff-in-Diff	(3) Puntland	(4) Somaliland	(5) IV Puntland
Log(Ransom)*Puntland	-0.022**				
	0.010				
$Log(Ransom)_{t-1}$*Puntland		-0.016			
		0.010			
Log(Ransom)	0.0001		-0.019***	-0.005	-0.021***
	0.008		0.007	0.009	0.006
$Log(Ransom)_{t-1}$		-0.001			
		0.009			
Puntland	-0.057	-0.110			
	0.092	0.091			
Log(Pirate Attacks)	0.048	0.038	0.002	0.088	0.036
	0.040	0.042	0.054	0.057	0.054
Log(Shipping)	-0.353	-0.225	-0.810	0.196	-0.613
	0.642	0.680	0.650	1.075	0.686
Monsoon	-0.733**	-0.703**	-0.739**	-0.788*	-0.640
	0.305	0.303	0.372	0.416	0.393
GDP Growth	-0.001	-0.001	-0.001	-0.004	0.002
	0.004	0.004	0.004	0.006	0.005
Ramadan	-0.175	-0.216*	-0.250	-0.206	-0.148
	0.116	0.126	0.164	0.162	0.132
Saudi Livestock Ban	-0.617**	-0.636***	-0.370*	-0.728*	-0.483*
	0.240	0.242	0.232	0.390	0.254
Maritime Police Force	0.658**	0.666***	0.471*	0.854***	0.209
	0.240	0.204	0.250	0.303	0.330
$Log(Exports)_{t-1}$					0.222
					0.450
Observations	171	171	81	90	80
R-squared	0.593	0.581	0.897	0.648	0.501
Durbin-Watson Statistic	1.91	1.92	1.60	1.96	

*significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors in parentheses adjusted for autocorrelation. Included but not shown are month fixed effects.

Figure 6: The Effect of Ransoms on Exports



This figure shows estimates of the effect of ransom disbursals on the value of exports from Puntland. The shaded area shows the 95% confidence interval. Predictions are from Table 2 Model 1.

We hypothesize ransoms will have the opposite effect on imports into Puntland (H3). As exports become less competitive and demand from non-tradable sectors expand, we should observe an increase in imports. Recall that we only have a limited sample of imports with which to make an estimate. Nevertheless and consistent with H3, Table 3 and Figure 6 show that ransoms have a strong *positive* effect on the value of rice, wheat and sugar imports into Puntland. These results imply that ransom payments increase Puntland's reliance on imports. These results hold even in a restrictive difference-in-differences specification and after accounting for response biases using instrumental variables. These effects are considerable: On average, a 9.5 million dollar ransom would increase imports of these commodities by about 1.7 million.

[Table 3 about here]

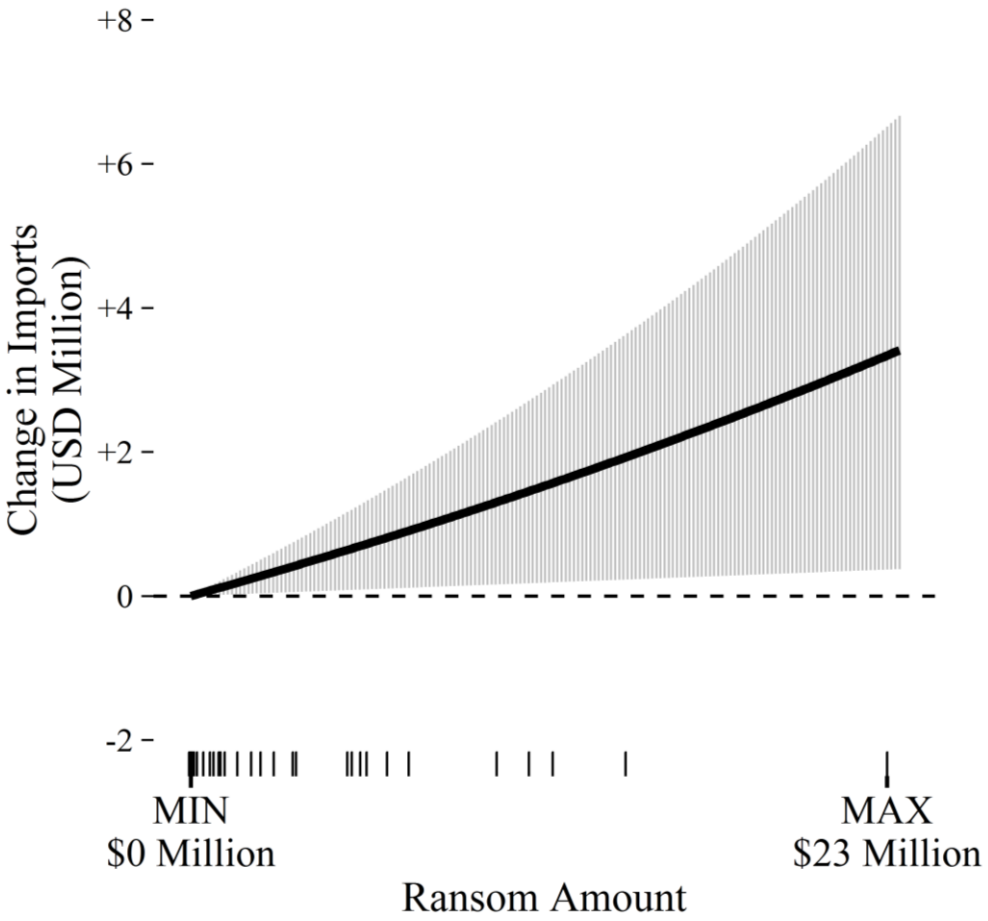
[Figure 6 about here]

Table 3: The Effect of Ransoms on Imports

	(1) Diff-in-Diff	(2) Diff-in-Diff	(3) Puntland	(4) Somaliland	(5) IV Puntland
Log(Ransom)*Puntland	0.018*				
	0.010				
$Log(Ransom)_{t-1}$*Puntland		0.008			
		0.011			
Log(Ransom)	0.004		0.023***	-0.003	0.0124**
	0.009		0.008	0.009	0.0011
$Log(Ransom)_{t-1}$		-0.001			
		0.009			
Puntland	-0.399***	-0.328***			
	0.107	0.112			
Log(Pirate Attacks)	0.056	0.075	-0.040	0.061	-0.095
	0.044	0.047	0.056	0.054	0.087
Log(Shipping)	2.46***	2.41***	2.644***	2.527***	3.588***
	0.529	0.550	0.614	0.780	0.697
Monsoon	0.222	0.250	0.150	0.187	0.207
	0.199	0.214	0.322	0.285	0.304
GDP Growth	-0.009***	-0.008**	-0.016***	-0.007*	-0.018**
	0.003	0.004	0.006	0.004	0.009
Ramadan	-0.379***	-0.345**	-0.156	-0.502*	-0.075
	0.169	0.170	0.153	0.289	0.161
Saudi Livestock Ban	-0.096	-0.188	-0.001	-0.167	0.303
	0.163	0.180	0.242	0.228	0.2673
Maritime Police Force	0.363**	0.284*	0.879***	0.094	0.460
	0.175	0.167	0.273	0.222	0.428
$Log(Imports)_{t-1}$					-0.368
					0.110
Observations	137	136	59	78	37
R-squared	0.977	0.973	0.993	0.979	0.780
Durbin-Watson Statistic	1.74	1.70	1.48	1.95	

*significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors in parentheses, adjusted for autocorrelation. Included but not shown are month fixed effects.

Figure 6: The Effect of Ransoms on Imports



This figure shows estimates of the effect of ransoms on the value of a selection of imports (the monetary value of rice, wheat and sugar in USD) into Puntland. The shaded area shows the 95% confidence interval. Predictions are based upon Table 3 Model 1.

5.2 Robustness Tests

Our main results show consistent support for our argument. Nevertheless, readers may still have concerns about potential confounds. In response, we conduct a range of robustness tests. Due to constraints, we report the full results of these tests in the supplementary appendices.

First, our results could be driven by relative price changes in imported and exported goods rather than changes in the consumption and production behavior in Somalia. While it is difficult to measure consumption and production behavior, we re-estimate our results in Table A1 in the appendices using the volume of goods imported and exported out of Puntland and Somaliland rather than the value of these goods. The results are similar to the estimates shown here, consistent with a behavioral response.

Second, while our difference-in-differences and instrumentation strategies help to rule out many alternative explanations, other confounds are possible. For instance, it is possible that piracy has undermined state capacity and promoted instability in Somalia and that this has contributed to a changing economic environment. Alternatively, ongoing naval patrols could have altered pirate activity in unmeasured ways. While data on these variables are difficult to obtain, in Table A2 in the appendices we re-estimate our results after including controls for battle events in Puntland (Raleigh et al. 2010), the density of naval patrols in the Gulf of Aden and the 2008 Puntland budget crisis (Jablonski and Oliver 2013), as well as an index of government effectiveness (Kaufman et al. 2011). While the 2008 Puntland budget crisis no doubt increased piracy levels (and thus ransom totals in the aggregate) and could have decreased exports, the budget crisis would have been unlikely to have increased imports of commodities, as happened after the injection of ransom payments into the Puntland economy.

Third, alternative sources of both licit and illicit capital flows such as foreign aid, remittances, and smuggling could confound our estimates. Unfortunately it is difficult to track many of these due to the lack of statistical capacity as well as the clandestine nature of illicit capital flows. What data we have suggest these flows are relatively small (perhaps with the exception of remittances) and that they do not track consistently with ransoms. For instance, by one estimate only about 4% of Somalia's foreign aid goes to Puntland (UNDP 2010). Remittances may have brought as much as USD 1.2 billion into Somalia in 2012. The share of this that went to Puntland is indeterminate, though likely much smaller (FSNAU 2013). Time series data on remittances in Puntland are unfortunately unavailable, though we have little reason to expect remittances to be systematically related to piracy.

These challenges notwithstanding, we do make an effort to control for alternative sources of foreign capital—both licit and illicit—where possible. In the appendix, we include controls for yearly flows of foreign aid and investment into Somalia, which should track flows into Puntland (Tables A2 and A6). Finding data on smuggling is nearly impossible even in developed and high-capacity states, and runs into the key challenge of a lack of data and that this paper seeks to overcome. Nevertheless, in the appendix we show estimates that control for human trafficking—one of the largest sources of illicit capital outside of maritime piracy. These data are derived from the Regional Mixed Migration Secretariat, an UNHCR-sponsored organization that tracks migration and human trafficking in the Horn of Africa. Migrant flows do not appear to trend consistently with piracy nor does the inclusion of these estimates as a control change our results substantively. We also re-estimate our results using alternative samples and lag specifications in Tables A3 and A5. Our results remain consistent.

Conclusions

In this paper, we overcome a key challenge in the study of illicit international political economy—the lack of data with which to reliably estimate the magnitude of illicit flows—and leverage insights from literature on the resource curse to explain the distributional effects of substantial inflows of illicit capital into a small, open economy. We argue and demonstrate evidence from Somalia that illicit capital flows had distributional effects similar to those associated with the resource curse through Dutch Disease mechanisms: Illicit capital flows generated from ransom payments appreciated the local currency, decreased income and activity in exporting sectors, and increased activity in illicit and non-tradable sectors. We christen these perverse outcomes the Tortuga Disease.

Somalia is perhaps a most likely case in which to observe the outcomes of the Tortuga Disease: The estimated magnitude of illicit capital flows relative to the size of the economy, though not historically unprecedented, is notable, and the discrete, and relatively public nature of ransom payment amounts makes the injections of illicit capital straightforward to track relative to other types of illicit flows. Relatively few other illicit flows are also entering Somalia, given us confidence that it is pirate profits specifically that are making up the illicit flows. Moreover, state collapse in Somalia precluded both state-led action to counter piracy and intervention in markets to counter the perverse effects of illicit capital flows. In this sense, Somalia functions as a 'proof of concept': if the Tortuga Disease applies anywhere, it should apply (and be observable) in the case of Somali piracy.

The concept can be applied elsewhere: while the Somali state's collapse was more complete than that of most failed states, the existence of territory where criminal actors can both take refuge and spend their illicit profits, and the propensity of those criminal actors to bring in money from

predating or selling to outsiders is not unique to Somalia. Other states with smaller illicit capital flows relative to the size of their economies should see similar, but smaller, 'symptoms' of the Tortuga Disease, as we saw with booming cocaine production in Colombia, which corresponded with increased service employment (particularly in construction), a decline in agriculture, and an overvalued peso (Holmes and Piñeres 2006; Thoumi 1995).

Our argument suggests several policy solutions for combating transnational crime: First, it provides weight to arguments in favor of national or international bans on extortion or ransom payments as a way to limit access to illicit capital.[29] At the least, hostage safety concerns should be balanced against the risk of further entrenching criminal economies and undermining legitimate employment. In parallel to limiting access to illicit capital, policymakers also should consider ways to bolster legitimate markets and stem the flow of labor and capital into more profitable criminal enterprises.[30] As we have suggested elsewhere, marginal interventions to bolster the livestock export market and stem declining public sector wages from 2004-2006 would likely have done much to prevent the explosion of piracy in Somalia.[32]

Our research also suggests new areas of academic inquiry: future scholars might consider the effect that the structure of criminal organizations might have on how and where the proceeds of crime are spent. While Somali pirates, from financiers down to the foot soldiers, may have been likely to spend their ill-gotten money on consumption within Somalia (Bahadur 2011; World Bank 2013, 59-63), the profits of other types of piracy, such as cargo hijackings, may be captured mostly

[29] See Dutton and Bellish 2014 for discussion.

[30] See Bueger 2012 for a discussion of several alternative livelihood projects in Somalia.

[32] Jablonski and Oliver 2013.0.

by financiers operating at an international scale (Hastings 2012) who are less likely to spend within a single country. Relatedly, while the effects of illicit flows from drug trafficking in Colombia exhibits similar patterns as in Somalia (Holmes and Piñeres 2006; Thoumi 1995), the structure of Colombian 'cartels' has shifted between networked and hierarchical in response to crackdowns (Kenney 2007), and it is possible that these shifts are accompanied by shifts in illicit flows that become visible upon closer inspection.

The effects of illicit flows are a blind spot in the study of international political economy. While data on other types illicit flows may not always be of the same quality as for maritime piracy, our research provides a path forward for the field by offering insights into where to look when studying the effects of illicit flows on licit side of the economy: which industries are booming, and where, which sectors are being hollowed out, and how imports and exports are faring in situations where there are suspected to be substantial illicit capital flows.

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