MARITIME PIRACY:
A CLOSER LOOK INTO DETERMINING FACTORS AND THE ROLE OF DETERRENCE

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Abstract

The global economic downturn in the era of COVID-19 may be marking a resurgence in maritime piracy, rendering a closer examination of the determinants of piracy extremely useful for the international shipping industry and for policymakers. We combine institutional, economic and legal explanatory factors to delve into the determinants of piracy in the cases of Nigerian and Somali piracy that feature prominently among the traditional piracy hotspots of West and East Africa respectively. Using data for the period 2002-2020 and panel estimation, we find that institutional factors (notably corruption) and socioeconomic factors (notably youth unemployment) relate to piracy in a positive manner, albeit to a different extent in each of the two regions studied. Institutional factors are more important in Nigeria, while economic factors stand out in Somalia. Moreover, the results assert our main hypothesis in the case of both areas examined, with pirates found to have a preference to attack ships with Western European flags, where legislation is less severe in terms of punishment for the crime of piracy. Thus, deterrence of maritime piracy needs to be coordinated at the international level to discourage pirates from exploiting differences in national legal frameworks. Finally, the inverted U-shaped relationship found between the Corruption Perception Index and piracy signifies that fighting corruption pays off, leading to rapid mitigation of piracy incidents in both regions examined.

Keywords:
Maritime piracy, legal framework, international cooperation, COVID-19, panel estimation

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1 Introduction

Acts of maritime piracy, namely boarding a vessel intending to commit illegal actions with the use of force[1], have been formally defined and measured since the mid-1980s. Reaching an annual peak around 2010, piracy incidents have experienced considerable decline internationally since then, partly due to increased cooperation between the naval forces of the countries involved and improved security measures on ships. Of late, however, there are signs of reversal of the declining trend observed since 2010, with growing concerns that the COVID-19 pandemic could be one of the causes behind the apparent reversal, as resources and security are directed to public health and the global economy suffers a downturn. The economic and financial backlash caused by the COVID-19 pandemic, could accentuate piracy incidents in traditional piracy "hotspots", such as Southeast Asia, the Gulf of Mexico, the Gulf of Aden and the Gulf of Guinea, expediting the spread of piracy elsewhere too.

Recent studies indicate that piracy is driven by a series of "push" factors that have to do with poverty and political instability in the country of origin of the pirates, but also "pull" factors, such as hefty economic possibilities owing to piracy loot (see, for example, UNODC, 2017; Bueger, 2021). Thus, recent developments in the determinants typically cited in the literature as underlying piracy incidents, such as corruption, inefficiencies in the implementation of law, political instability and adverse economic conditions in the country of origin of the pirates, add to concerns for a resurgence of piracy threats in certain areas. The measurements conducted by the International Maritime Organization (IMO, 2021) assert that the number of piracy and armed robbery incidents reported in Southeast Asian waters has gone up by twice as much in the past couple of years, while most maritime kidnappings take place in the Gulf of Guinea, off Nigerian waters. The attacks in the Gulf of Mexico have increased due to the political instability in the area, with most of them targeting ships and platforms related to Mexico's oil industry. In addition, there are concerns of a resurgence of piracy incidents in the Gulf of Aden in East Africa, where the activity of Somali pirates has up until recently been contained following coordinated international naval efforts, improved local governance, and reinforced security measures aboard ships.

Given this overall global picture, the purpose of this study is to explore the underlying causes of maritime piracy, combining legal, economic and institutional dimensions of piracy motives. Our contribution to the growing body of research on maritime piracy is that to the best of our knowledge this is the first paper that quantifies the impact of an under-researched so far factor that may affect maritime piracy, namely the focus of pirates on attacking ships whose flag represents countries with laxer legal framework against piracy. For this purpose, we study piracy incidents in the piracy hotspots of the Gulf of Guinea and the Gulf of Aden between 2002 and 2020 and hypothesize that pirates maximize the expected benefits from piracy by preferring to attack ships with flags of countries that practice light penalties, thus minimizing costs associated with arrest and conviction.

The results of the panel estimation deployed in the empirical part of the paper confirm that indicators of youth unemployment and corruption boost the incidence of piracy, albeit each of these variables affects each region differently. In Nigeria, institutional factors, particularly corruption, is more important in determining piracy than socioeconomic factors, particularly youth unemployment and vice versa for Somalia. More importantly, our findings reveal that in both cases pirates have "preferred" flags, tending to attack ships with the flag of countries where they would be given less severe punishment if arrested. Thus, legal factors are equally important in both regions

[1] https://www.imo.org/en/OurWork/Security/Pages/PiracyArmedRobberydefault.aspx

examined. The major policy implication that stems from these findings corroborates the assertion in the extant literature that deterrence of maritime piracy must be coordinated at the international level to avoid pirates taking advantage of such arbitrage opportunities due to the lax legislation that happens to characterize some countries.

The structure of the paper hereafter includes a presentation of the legal framework on piracy deterrence in section 2 and a brief review of prior research in section 3. The methodology followed is deployed in section 4. Section 5 starts by giving basic facts and figures of piracy developments in the areas and over the period of study followed by presentation of empirical results and discussion of findings. Finally, concluding remarks are given in section 6.

2 The Legal Framework on Piracy Deterrence

The United Nations Convention on the Law of the Sea (UNCLOS) formally defines piracy in a three-fold manner. First, piracy is any "illegal act of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed a) against another ship, or against persons or property on board such ship in international waters or b) against a ship, persons or property in a place outside the jurisdiction of any State". Second, piracy is associated with "any act of voluntary participation in the operation of a ship with knowledge of facts making it a pirate ship". Third, piracy is associated with "any act of inciting or of intentionally facilitating an act described above"[2].

This type of definition, however, suffers from inherent weaknesses. As pointed out by Karim (2014), the UNCLOS definition has a geographically restricted designation and lack of reference to the responsibility for prosecution of offenders. Although according to UN Security Council regulations international cooperation for the repression of piracy is compulsory, individual countries are not required to sue pirates in national courts, rendering prosecution of offenders a political decision of individual states (Karim, 2014). This makes enforcement of the Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation ("SUA Convention"), which forces states to prosecute pirates in their national courts, all the more important. The SUA Convention of 1988 lists several acts, including seizure and unauthorized control over a ship, as unlawful and punishable under national laws of the parties to the convention. Article 3 of the 1988 Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA) provides for a broader definition of illegal activity at sea as follows (Eurojust, 2013):

1. "Any person commits an offence if that person unlawfully and intentionally:

> a) Seizes or exercises control over a ship by force or threat thereof or any other form of intimidation; or
> b) Performs an act of violence against a person on board a ship if that act is likely to endanger the safe navigation of that ship; or
> c) Destroys a ship or causes damage to a ship or to its cargo which is likely to endanger the safe navigation of that ship; or
> d) Places or causes to be placed on a ship, by any means whatsoever, a device or substance which is likely to destroy that ship, or cause damage to that ship or its cargo which endangers or is likely to endanger the safe navigation of that ship; or

[2] https://www.un.org/depts/los/piracy/piracy_legal_framework.htm

e) Destroys or seriously damages maritime navigational facilities or seriously interferes with their operation, if any such act is likely to endanger the safe navigation of a ship; or
f) Communicates information which he knows to be false, thereby endangering the safe navigation of a ship; or
g) Injures or kills any person, in connection with the commission or the attempted commission of any of the offences set forth in subparagraphs (a) to (f)".

2. "Any person also commits an offence if that person:

a) Attempts to commit any of the offences set forth in paragraph 1; or
b) Abets the commission of any of the offences set forth in paragraph 1 perpetrated by any person or is otherwise an accomplice of a person who commits such an offence; or
c) Threatens, with or without a condition, as is provided for under national law, aimed at compelling a physical or juridical person to do or refrain from doing any act, to commit any of the offences set forth in paragraph 1, subparagraphs (b), (c) and (e) above, if that threat is likely to endanger the safe navigation of the ship in question".

Article 5 of the SUA Convention obligates states to make the offences "punishable by appropriate penalties", while article 8 allows the "flag state" to deliver a suspected offender to the authorities of a "receiving state", which may request the flag state to accept delivery of that person, unless the latter can present reasoning why they are not willing to receive this person (Eurojust, 2013). As explained by Karim (2014),

> "The flag state may instruct the master of the vessel to deliver the person to the nearest country. If the master does so, then the flag state has an obligation to accept that person from the receiving state. If the flag state instructs its officials to release the alleged offender without taking any legal action, it may be a violation of its obligations under Articles 5 and 8 of the SUA Convention".

While punishment for the crime of piracy committed in national seawaters fall clearly under the jurisdiction of national law, piracy offences committed in international waters, do not fall in the jurisdiction of any particular state. In such cases, arrested offenders are sued and tried in congruence with the legal framework of the country of origin of the vessel (carrying the respective country's flag) that made the arrest. Moreover, in accordance with international law, national navy ships have the right to hunt down and arrest pirates in international waters. Ships of any national navy are obligated to hunt down pirates if they come across them and provide help to the ships that are under attack. In contrast, to hunt down pirates while sailing in the national waters of any country, warships need to get permission from that country's State authorities. Along the same lines, legal jurisdiction is in the hands of the government of the naval force that makes the arrest if piracy occurs in international waters or in the hands of the national government if piracy occurs in national waters (Mason, 2010). Thus, under international law lawsuits against pirates is entirely within the domain of national courts, as no international court has authority to indict for piracy (Karim, 2014). Even if international law provides for the possibility to curb piracy at sea, implementation of international law necessitates implementation of the procedures imposed by national laws. Thus, pertinent provisions in national legal systems would be a requirement to combat piracy (Satkauskas, 2011).

An additional challenge is presented by the fact that maritime piracy affects several different nations simultaneously. As pointed out by Kontorovich (2012a), ships may be under the flag of one state,

owned by another, operated by a third and having a crew consisting of many nationalities. Furthermore, the pirates, the navy that catches the pirates, and the nation that is to investigate and prosecute the case, are likely to be different. According to Article 12 of the EU Council Joint Action the legal basis of Operation ATALANTA:

> "persons having committed or suspected of having committed, acts of piracy or armed robbery in Somali territorial waters or on the high seas, who are arrested and detained, with a view to their prosecution, and property used to carry out such acts, shall be transferred: (a) to the competent authorities of the flag Member State or of the third State participating in the operation, of the vessel which took them captive, or (b) if this State cannot, or does not wish to, exercise its jurisdiction, to a Member States or any third State which wishes to exercise its jurisdiction over the aforementioned persons and property" (quoted in Kontorovich, 2012a).

Different sentences for similar crimes raise questions of fairness, especially when the lawsuits are part of an international effort to combat piracy. While timely prosecution of pirates serves as an effective deterrent, discouraging new people from being recruited as pirates (Karim, 2014), wide variation in punishment across jurisdictions tends to offset the deterrent value of such punishment because potential do not have information about the kind of sanctions they might actually face (Kontorovich, 2012a).

Finally, it is worth noting that arrested pirates are often not detained as this might constitute a violation of their human rights that could lead to claims for asylum in the countries whose navy made the arrest. As Treves (2009) puts it,

> "…seizing states are reluctant to exercise the powers granted to them by UNCLOS and Security Council resolutions on captured pirates, because they are concerned with the human rights of the captured individuals.
>
> [For example,] any use of force against pirates off the coast of Somalia seems authorized as an exception to the exclusive rights of the flag state, with the limitation that it will be reasonable and necessary and that the human rights of the persons involved are safeguarded".

3 Prior research

Researchers appear to be divided on the effectiveness of the legal framework against piracy, primarily with regard to the level (national, regional or international) at which law should be implemented and enforced. Some scholars argue that the phenomenon of piracy should be addressed at the international level, in an International Criminal Court (see, for example, Dutton, 2010; Satkauskas, 2011; Randrianantenaina, 2013; Hallwood and Micelli, 2015). As put by Scott (2014), piracy constitutes an excellent opportunity for the international community to mount an international response to organized crime. Other studies emphasize the complexities involved in the existing international legal and institutional framework for suing pirates, claiming that because penal norms differ between nations, national punishments that are consistent with national legal measures would be more relevant and more just (see, for example, Kontorovich, 2012a, 2012b; Karim, 2014).

Either way, the challenge is that although international law provides a definition for piracy as a crime, it does not define pertinent penalties. As a result, piracy prosecutions currently lead to massive unevenness in punishments across different countries, with US legislation being generally

stricter than European legislation. It is important to stress, however, that jurisdictional differences across different countries are directly related to and have more to do with variations in the nature of the legal framework, the sentencing norms and mentalities of the nations that arrest the pirates than with the underlying crimes that the pirates commit (Kontorovich, 2012b). Still, disparities in penalties across different countries seem to bring forth a kind of "arbitrage" that may be exploited by pirates, who may actively be seeking to attack ships with flags of countries that are more tolerant to pirates. This way, they would minimize the cost if they are caught.

Obviously, combating piracy presents a variety of challenges. In the first place, piracy imposes judicial burdens pertaining to independence of judges, difficulties of obtaining and preserving evidence, and fears that if convicted, the pirates will be able to remain in the country where they are prosecuted (Eurojust, 2013). Secondly, piracy entails economic challenges at multiple levels, as it disrupts seaborne trade, which constitutes about 90% of international trade[3] imposing a kind of tax on ship-owners for security, insurance and other precautionary measures to protect their cargo from pirate attacks. In addition, piracy may adversely affect developmental aid, as it happened with interruption of the World Food Program for Somalia in 2007 (Dutton, 2010). Related to economic challenges, piracy entails political challenges as it may lead to destabilization of governments that depend on international shipping to raise revenue, notably Sudan, Saudi Arabia, Eritrea, Djibouti, Yemen, Oman, and Kenya, as well as environmental damage in the event of oil spills (Dutton, 2010).

More importantly, because piracy occurs at sea, in most western nations, including those of the European Union, national criminal law does not specifically define piracy. Instead, piracy is included in provisions contained in the Criminal Code in each different country. Thus, there is no dedicated legal framework to deal with this type of crime in most countries. In fact, lax legislation in some western countries may act as an incentive for piracy. Dutch law, for example, is a case in point. As pointed out by Freeman (2010) in an article in *The Telegraph*, in Holland the heaviest conviction pirates are likely to get is "five years in a comfortable Dutch prison, where rather than bread and water, each will have a private cell complete with television, lavatory and shower". Moreover, upon release, pirates can apply to stay in Holland and bring their families to join them. Thus, the gist of the argument is that piracy becomes a career option, offering reasonable returns, including an opportunity to start a new life in Europe (Colin Freeman, *The Telegraph*, June 13, 2010).

Of course, western countries do not wish to have pirates applying for asylum once they have served their time in prison, which is what led to "sub-contracting" of bringing pirates to justice to other countries, notably Kenya. The undesirable implications for the Kenyan judicial system and the human rights of pirates themselves associated with sub-contracting prosecution of pirates has led many legal commentators to call for creation of an international court that could fill the impunity gap and properly pass judgment on pirates and safeguard impartial and fair administration of justice (Dutton, 2010). Law enforcement may be more economically meaningful if undertaken at the international level, as financial costs may be too high to be borne by just one country, while also achieving greater uniformity in punishing measures (Hallwood and Micelli, 2015).

Rationality on the part of pirates and enforcement of the law on the part of authorities are vital assumptions underlying the effectiveness of punishment. While there is evidence that pirates respond to threats of punishment (UNODC, 2017), there is no consensus as to what the most effective way to address maritime piracy is. Some researchers advocate the formation of international judicial institutions for the prosecution of pirates (Zinovieva et al., 2015; Satkauskas,

[3] ICS, 2017, https://www.ics-shipping.org/shipping-fact/shipping-and-world-trade-world-seaborne-trade/

2011), others put forward operationalization of national courts through enforcement of pertinent international legal instruments within domestic legal systems (see, for example, Karim, 2014).

International law does not explicitly set common penalties for piracy crimes. As pointed out by Kontorovich (2012b), the typically large number of offenders from a single piracy incident offers an empirical window into the interactions between international and national law in courts, as it does into factors affecting punishment for international crimes, the hierarchy of international offenses, and the current model of punishing piracy. Studying Somali piracy sentences in foreign courts, Kontorovich (2012b) finds that the global average sentence for piracy is about fourteen years, which is close to the average penalties for more serious human rights offenses in international courts. In contrast, Kontorovich (2012b) finds that sentences range from four years to life and few pirates get the average sentence. Thus, there seem to be either too strict (USA, Asia) or too lenient (Europe) jurisdictions, which is attributable to idiosyncratic characteristics of the prosecuting state, as national courts tend to treat international crimes in a manner consistent with the national scale of punishments. Clearly, issues of inequity are raised for similar piracy offenses, obstructing the creation of a pertinent international court of justice for piracy offenders. This situation leads to win-win situation for piracy offenders: on the one hand, typical European punishments may in effect be consolation prizes for failed pirate attacks; on the other hand, if western nations applied heavier penalties, they may be more reluctant to arrest and prosecute pirates. Thus, stiffer penalties could result in less net punishment (Kontorovich, 2012a).

All in all, on the one hand the assertion that “crime pays” and there is nothing the authorities can do about it seems to be characteristic of piracy crimes. On the other hand, high economic costs on victims, as well as costs associated with crime prevention and sustaining the prison system continue to impose a burden on taxpayers in western countries, calling for law enforcement to deter piracy. In this context, the purpose of this paper is to explore the degree to which going illegal constitutes a win-win situation for pirates. Pirates may look forward to either becoming rich, if they are not caught, or serving time in a prison in the West, where life is decent for prisoners compared to their own country and where they may apply for asylum upon their release.

Like with any type of stealing other people’s property, the goal of those who engage in piracy is to acquire wealth. In any economic setting, pirates evaluate the expected returns from piracy to the expected costs and compare those to acquisition of income from formal work in their home countries. The main hypothesis of the present study is that given the legislative framework for punishing the crime of piracy in the West, not only do benefits exceed costs in the above comparison but also, in many cases, there are no costs for pirates at all. This may be attributable to the fact that arrest, conviction and imprisonment are a better option in the eyes of pirates than both income from formal employment and the standard of living in their home country.

4 Methodology

Our empirical analysis examines three theoretical questions including legal, sociological and economic factors exploring the underlying causes of piracy by drawing on the existing literature and looking into novel aspects. The dependent variable is piracy incidents taking place in the territorial and international waters corresponding to six areas selected (East and West Africa, Arabian Sea, Indian Ocean, Malacca Straights and South China Sea) from 2002 to 2019 committed by pirates from Somalia, Nigeria, Yemen, Malaysia, Indonesia and the Philippines. In this context, the paper focuses on the first two cases, aiming at assessing some of the findings in the extensive literature that

considers the similarities and differences of piracy incidents in the East and West coasts of Africa (e.g. Nincic, 2009, Neethling, 2011, Biziouras, 2013, Roelofse 2014). The period of study is from 2002 to 2020. The data for piracy incidents are obtained from the International Maritime Organization (IMO) database.

Our first hypothesis focuses on the effect of institutional quality on the dependent variable. Drawing on the literature that suggests that piracy is a result of permissive institutional environments (see, for example, Daxecker and Prins, 2013) we expect more piracy incidents to be associated with deteriorating institutional quality. Two institutional quality indicators, namely regulatory quality and Rule of Law are extracted from the World Bank's governance indicators database to proxy institutional quality. Moreover, the Corruption Perception Index from the Transparency International database is adopted as an alternative measure of state's institutional quality. For each of these variables, higher values correspond to improvements in institutional quality.

Our second hypothesis involves the legal aspect of the punishment of committing the crime of piracy, which contributes to our understanding of the causes of piracy, as it has not previously been introduced. In this regard, the effect of the "flag state" of the ship involved in a piracy incident is entered in the specification distinguishing the incidents that were committed in international waters in ships with flags representing mainly western countries whose legal system does not entail severe punishment. The relevant literature provides the motivation. As mentioned in section 3 prior research has dealt with the issue of punishment of maritime piracy arguing that there is no uniformity among countries (see Hallwood and Miceli, 2014). Further, Kontorovich (2012a, b) discusses the existing variation in sentences from 4 to 14 years. The above clearly creates an incentive for pirates to "prefer" the ships with flags from countries with no severe punishing laws. We chose to quantify these arguments and include among the independent variables the "flag state". We expect a positive relationship with piracy incidents, implying an existing preference of the pirates to attack "good flag" ships (Kontorovich 2012b, Karim, 2014).

Finally, we explore differences in the effect of given independent covariates in different regions. The importance of the given region's characteristic i.e., youth unemployment or the level of corruption, to determine piracy attacks is examined by constructing its interaction with the region's fixed effect and using is as independent variable (Gries and Redlin, 2019; Martinez-Zarzoso and Bensassi, 2013). Relevant studies in the literature that put emphasis on the macro causes of piracy claim that pirates are significantly motivated by financial gain. For example, according to Hallwood and Miceli (2014), Somali pirates although they claim that they are motivated by the 'honor' of protecting Somalia's interests in fact they seek financial gain. So, factors such as poverty, income and socioeconomic conditions are thought as main causes of piracy. Similarly, Modarress et al. (2012) have found that the absence of military forces along with increasing marine trade, global poverty, human trafficking, and weapons smuggling contribute to increased piracy attacks.

Based on the above, we consider economic growth, development and prosperity indicators as important in the development of piracy incidents and introduce them in the model as control variables. We take it that in states or regions where youth unemployment is high and GDP growth is low, piracy incidents may exhibit an upward trend. Pertinent data are obtained from World Development Indicators database of the World Bank. Using the same data source, we include the effect of access to internet and of the number of physicians per 1,000 people to provide further evidence in support of the argument that improvements in economic development can deter piracy. Finally, we control for specific events during the time-period examined, such as coups and conflicts, defining a relevant dummy variable that corresponds to outliers detected in the data.

To test our hypotheses, we adopt the following specification:

$$INCID = a_{1it} + a_{2it}\Delta\ln(GDP) + a_{3it}GoodFlag + a_{4it}\Delta\ln(YUN) + \\ + a_{5it}institutional\ quality + a_{6it}(Countrydummy * Corruption) + \\ + a_{7it}(Country\ dummy * \Delta(\ln(YUN)) + event\ dummy + error \quad (1)$$

The dependent variable $INCID_i$ takes values that equal the number of attacks by pirates to vessels of country *i*. We log-transform the GDP and the YUN variables to reduce the impact of highly skewed values. In addition, we take first differences of these variables since the unit root tests showed the presence of a unit root. The definition of variables is given in Table 1. Tables 2 and 3 present descriptive statistics and correlation analysis respectively. In Table 3 the correlation of incidents with the chosen independent variables is shown to be significant and of the expected sign with the exception of INTERN and DOCS that have the correct sign but are marginally significant.

Table 1. Definition of Variables

INCID	The probability of an incident (attack)
$\Delta\ln(\text{GDP})$	COUNTRY GDP/WORLD GDP
GoodFlag	Western flag ships
$\Delta\ln(\text{YUN})$	Youth unemployment
Regulatory quality (Reg. qual.)	institutional quality
Rule of law	institutional quality
Corruption perception index (cpi)	institutional quality
NIGERIA fixed effect*corruption perception index	interaction
SOMALIA fixed effect*corruption perception index	interaction
NIGERIA fixed effect $*\ \Delta(\ln(\text{YUN}))$	interaction
SOMALIA fixed effect $*\ \Delta(\ln(\text{YUN}))$	interaction
Intern access	Prosperity indicator
Doctors (DOCS)	Prosperity indicator
oil	Crude oil price
Event dummy	Dummy taking the value 1 for the years of coups or major conflicts and 0 otherwise

Table 2. Descriptive Statistics

	INCID	GDP	YUN	Reg. qual.	Rule of Law	CPI	INTERN	DOCS	OIL
Mean	26.34	26.56	16.06	28.44	-1.08	2.41	20.05	0.47	71.59
Median	12.00	22.04	15.06	23.67	-1.03	2.45	7.96	0.38	68.22
Maximum	224.00	105.43	27.35	74.04	0.50	5.10	71.06	1.54	111.96
Minimum	0.00	0.88	7.41	0.47	-2.61	0.80	0.32	0.02	25.00
Std. Dev.	46.46	26.30	6.89	22.71	0.88	1.13	21.83	0.44	26.80
Skewness	3.13	1.74	0.35	0.37	-0.14	0.58	0.92	0.95	0.03
Kurtosis	12.36	5.53	1.49	1.98	2.28	2.99	2.41	2.58	1.96
Jarque-Bera	306.44	44.74	6.70	3.80	1.46	3.25	9.01	9.10	2.64
Probability	0.00	0.00	0.04	0.15	0.48	0.20	0.01	0.01	0.27
Observations	58	58	58	58	58	58	58	58	58

Table 3. Correlation Analysis

	INCID	GDP	YUN	Reg. qual.	Rule of Law	CPI	INTERN	DOCS
INCID	1.000							

GDP	-0.295	1.000						
	(-2.313)	-----						
YUN	0.340	-0.506	1.000					
	(2.707)	(-4.386)	-----					
Reg. qual.	-0.299	0.815	-0.676	1.000				
	(-2.343)	(10.534)	(-6.863)	-----				
Rule of Law	-0.384	0.851	-0.713	0.950	1.000			
	(-3.114)	(12.141)	(-7.603)	(22.669)	-----			
CPI	-0.315	0.918	-0.576	0.888	0.928	1.000		
	(-2.482)	(17.26)	(-5.278)	(14.48)	(18.57)	-----		
INTERN	-0.176	0.736	-0.319	0.546	0.640	0.759	1.000	
	(-1.338)	(8.143)	(-2.520)	(4.878)	(6.234)	(8.721)	-----	
DOCS	-0.200	0.633	-0.660	0.833	0.780	0.641	0.446	1.000
	(-1.528)	(6.126)	(-6.573)	(11.257)	(9.338)	(6.242)	(3.729)	-----
OIL	0.148	0.049	0.110	-0.007	-0.066	0.033	0.154	-0.044
	(1.116)	(0.369)	(0.827)	(-0.054)	(-0.494)	(0.250)	(1.165)	(-0.329)

Note: Pearson correlation coefficients are calculated for the sixth dimensional panel with the respective t-statistics in parentheses.

A panel of the six regions for the given time period is created and the general estimating equation (GEE) method with a negative binomial specification is used to estimate it. The use of a binomial model is a common practice in the literature since piracy incidents, the dependent variable, is a count variable, which is discrete and not continuous, with variance larger than its mean (see, for example, Daxecker and Prins, 2013).

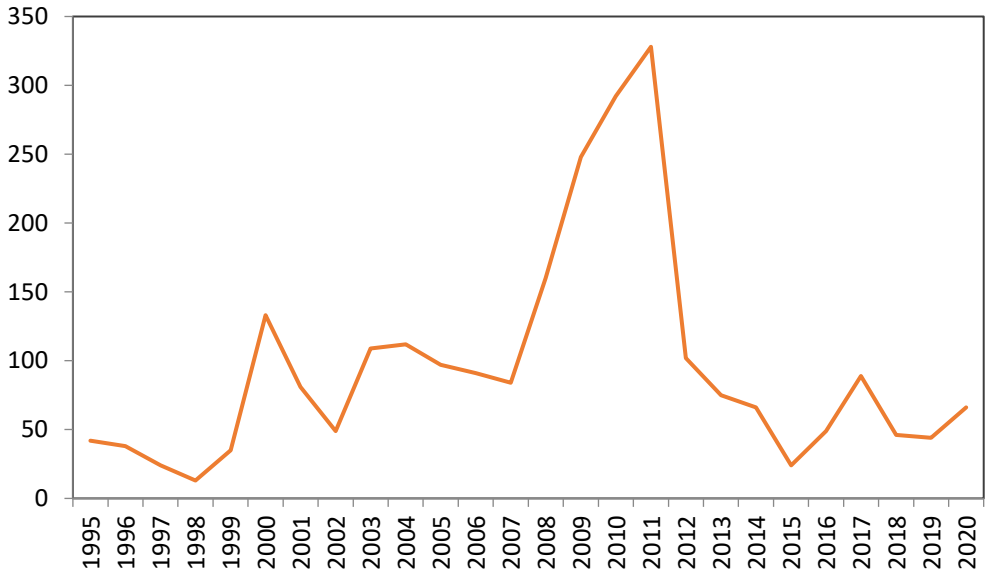
5 Empirical Evidence

5.1 Facts and Figures

According to data collected and publicized by the International Maritime Organization (IMO), the evolution of maritime piracy incidents followed an upward trend throughout the 1990s, experiencing a true explosion in the late 2000s and falling thereafter (Figure 1). In addition, as illustrated by Figure 2, among the areas that demonstrate notable maritime piracy activity over the past two decades or so, East Africa (Gulf of Aden) and the South China Sea stand out. Growth in piracy incidents in the other areas depicted in Figure 2 is equally worrisome, as there are signs that piracy is expanding faster in certain areas, notably in the West Coast of Africa (Scott, 2014). In the first half of 2020, the number of piracy and armed robbery incidents reported in Asian waters has more than doubled compared to the previous year, while the Gulf of Guinea off West Africa accounts for most maritime kidnappings worldwide. Furthermore, there are concerns about

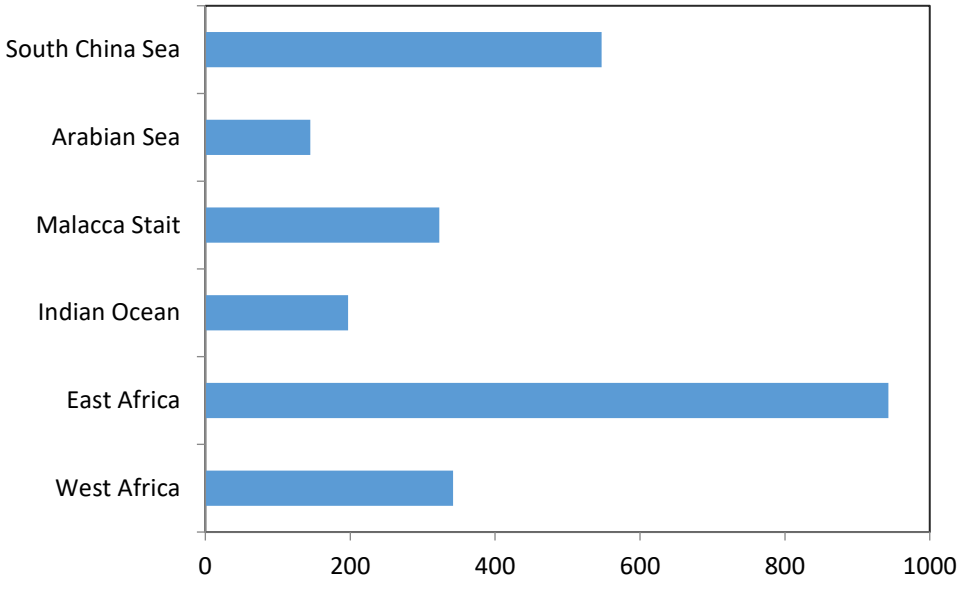
resurgence of maritime piracy in East Africa, where the activity of Somali pirates has so far been contained thanks to a combination of coordinated international naval efforts, improved local governance and enhanced security measures aboard ships, including armed personnel.

Figure 1. Total Piracy Incidents



Source: IMO database

Figure 2. Top-Six Piracy Locations (2002-2020)



Source: IMO database

The IMO cites corruption, the weak rule of law, political instability, and adverse economic conditions as leading factors behind piracy (IMO, 2021). Thus, additional concerns stem from a potential economic downturn, of the sort caused by the COVID-19 pandemic, for example, that may cause a rise in piracy in other regions of the world, as individuals living in those regions search for alternative means of income. Fears that the declining trend may be reversed are surfacing during the era of the

pandemic, because both resources and security are directed to priorities relating to safeguarding public health everywhere around the globe.

5.2 Results and Discussion

We report our findings in Tables 4 and 5. Table 4 gives the negative binomial estimation results for four separate models involving four alternative specifications (models 1 to 4) to check the robustness of our results. Further, Table 5 reports evidence from marginal effects. All four models have the control socioeconomic variables, as well as the "good flag" variable, in common. In addition, we include selected institutional quality variables. The results presented in both tables are statistically significant and have the expected sign, asserting their importance in determining piracy incidents.

Economic development in terms of a region's increasing GDP growth relative to world GDP, along with increases in youth employment deter piracy in the regions examined. The "good flag" variable has a positive coefficient, supporting our second hypothesis and indicating the preference of the pirates to attack ships with a western flag, where there is less severe punishment. A result that permeates models 1 to 3 is that improvements in institutional quality is a preventive factor to piracy incidents since the sign of the Rule of Law variable in model 1 is negative. In addition, in models 2 and 3, we observe a non-linear relationship of a quadratic form with the coefficient of the Corruption Perception Index being negative, thus implying an inverted U-shaped curve.

Figure 3. Non-linearity in the relationship between corruption and piracy incidents

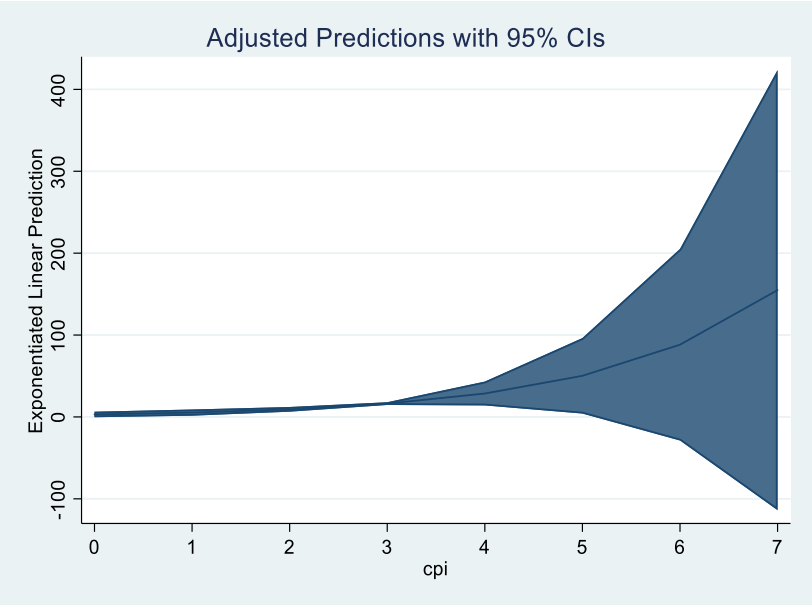


Figure 3 presents the predicted response of the exponent of the predicted probabilities against changes in the Corruption Perception Index, which is non-linear and, if extended, takes an inverted U-shape. This result indicates that fighting corruption pays off, leading to successfully and rapidly reducing piracy. These results corroborate the findings of Hastings (2009) and de Groot et al. (2011), who also report "a curvilinear" or ''hump''-shaped relationship between state efficiency and piracy and conclude that collapsed or failed states may be incapable to combat piracy.

The last model presented in Table 4, model 4, investigates the effect of some of the variables examined isolating specific regions. To examine this conditional effect, we include the interaction[4] between the Corruption Perception Index and the regions of Nigeria and Somalia. Similarly, we include the interaction of the same regions with youth unemployment. The results show that the effect of governance or socioeconomic variables differs across these two regions. The coefficient of the variable that refers to the effect of corruption is negative and significant for Nigeria and insignificant for Somalia. In contrast, the coefficient of the variable that refers to the effect of youth unemployment in the two regions is significant and positive in the case of Somalia only.

These results illustrate the intuitive fact that there are region-specific factors that influence piracy incidents in different cases. More specifically, Somalia ever since the 1991 civil war is a failed state. The country has been decimated by war and the conflict is still on going. Additionally, there is no navy since 1991, therefore no control over its seas is practiced which creates a power vacuum offshore. An argument is made by Somali pirates that in the absence of a state, the national resources cannot be looted and income to be lost to foreign actors. Particularly a case has been made for the fishing industry to suffer greatly in Somalia, which leads to a major loss of income. Therefore, piracy appears as a just and only alternative to young unemployed Somalis. Whatever the case, Somalia is an extremely poor nation and the financial incentives for piracy are tremendous. It is reasonable for unemployment to be a more decisive factor in Somalia than Nigeria.

On the other hand, Nigeria is a sovereign, rather than a failed state being the 12th largest producer of petroleum in the world and the eighth largest exporter, with petroleum accounting for 40% of its GDP and 80% of government earnings. The failure in the case of Nigeria, however, lies with income distribution, while the pollution caused by the oil refineries is detrimental to the fisheries industry, second to that of the oil. This conflict of interests promotes friction in the area, fueled by the MEND (Movement for the Emancipation of the Niger Delta) terrorist activities causing political unrest that accentuates the problem of piracy in the region. The financial gains from piracy provide incentives for organized crime, which makes the situation increasingly harder to resolve. Additionally, Nigeria has failed to adopt the UNCLOS (Law of the Sea) in its judicial system or effectively combat piracy, it is reasonable to suspect that behind the lost money trail from piracy in Nigeria, the government is acting as if having a vested interest in piracy continuing. Therefore, it stands to reason that the corruption interaction variable to be a more important factor in the West Africa piracy incidents[5].

Finally, the marginal effects given in table 5 show the change in average probability of a piracy incident occurring caused by a unit change in the given independent variable. For example, a unitary increase in the two regions' GDP relative to world GDP on average is expected to produce an around 38% drop in the number of piracy attacks in the first model. Similarly, on average there is a strong preference for a "good flag" to attack and an equally strong and significant effect derived from the existence of youth unemployment. Finally, the incidents respond significantly to a unit change in institutional quality, which is more obvious in the non-linear case presented in model 3.

[4] The fixed effect of each region is multiplied with the corruption perception index or with youth unemployment.

[5] For a thorough analysis and comparison between Nigeria and Somalia, see Neethling, 2011 and Roelofse, 2014).

Table 4. Panel Negative Binomial Regressions, 2002-2020 Dependent variable: INCID				
Explanatory vars	**Model 1**	**Model 2**	**Model 3**	**Model 4**
D(ln(GDP))	-3.038 (-6.060)	-2.130 (-3.160)	-3.740 (-5.130)	-0.704 (-1.880)
Good flag dummy	1.033 (2.920)	1.364 (3.130)	1.391 (4.280)	1.463 (3.790)
D(ln(YUN))	1.461 (1.760)	1.603 (1.720)	2.789 (2.010)	2.534 (3.170)
Reg qual.WB	-	-	-0.790 (-3.320)	-
Rule of lawWB	-0.163 (-3.420)	-	-1.878 (-1.570)	-
Corr perc index	-	0.563 (2.700)	2.509 (4.080)	-
Corr perc index squared	-	-0.163 (-3.980)	-0.225 (-3.460)	-
D(ln(intern access))			-0.586 (-2.330)	-
Ln(doctors)			-1.765 (-3.520)	-
oil			-1.765 (-3.520)	-
Constant	1.459 (4.620)	2.859 (9.490)	-5.118 (-3.180)	1.223 (8.420)
Trend squared	-	-0.0001 (-4.900)	-	0.001 (5.290)
D	1.239 (7.770)	-	1.185 (4.380)	-
Nig*corr per ind	-	-	-	-0.091 (-3.470)
Som*corr per ind	-	-	-	-0.305 (-1.670)
Nig*d(ln(YUN))	-	-	-	-0.465 (-0.560)
Som*d(ln(YUN))	-	-	-	35.96 (14.30)
Wald χ^2	303.59[0.000]	63.93[0.000]	95.46[0.000]	-

Note: t statistics are in parentheses and p-values in brackets. In model 3/(4) the country dummies for Indonesia and Nigeria /(Somalia, Indonesia and Philippines) have been included as being significant. The STATA command, xtgee was used for the panel estimation with the negative binomial method. D is a dummy variable taking into account major events that consist outliers in the sample.

Table 5. Marginal Effects for the Models of Piracy Incidents				
	Model 1	**Model 2**	**Model 3**	**Model 4**
D(ln(GDP))	-38.33 (-4.730)	-31.101 (-3.970)	-46.37 (-4.920)	-10.216 (-1.900)
Good flag dummy	12.881 (3.230)	19.702 (3.120)	18.28 (4.140)	21.246 (3.880)
D(ln(YUN))	18.75 (1.870)	23.202 (1.720)	36.059 (2.010)	36.80 (3.250)
Reg qual.WB	-	-	-10.68 (-3.520)	-
Rule of lawWB	-2.112 (-4.110)	-	-20.38 (-1.470)	-
Corr perc index	-	7.807 (1.970)	34.65 (4.890)	-
Corr perc index squared	-	-2.243 (-3.150)	-3.233 (-4.060)	-
D(ln(intern access))	-	-	-8.57 (-2.840)	-
Ln(doctors)	-	-	-21.243 (-2.740)	-
oil	-	-	0.321 (2.950)	-
Nig*corr per ind	-	-	-	-1.314 (-3.440)
Som*corr per ind	-	-	-	-4.440 (-1.670)
Nig*d(ln(YUN))	-	-	-	-6.758 (-0.570)
Som*d(ln(YUN))	-	-	-	522.25 (12.84)

Note: t-statistics are in parentheses

6 Concluding Remarks

Modern maritime piracy has a steady presence in international waters, even though it has declined markedly since the peak of 2010. This declining trend, however, seems to have been reversed since 2018 and there are growing concerns that COVID-19 pandemic and the resulting economic downturn are among the causes behind such a reversal. Hotspots that have attracted maritime piracy activity through the years include the Gulf of Aden, associated with Somali pirates mainly during the previous decade, Southeast Asia, the Gulf of Mexico and the Gulf of Guinea.

It appears that the economic and financial problems caused by the pandemic, will cause a rise in piracy in these regions and possibly in others around the world, as illustrated by the trends in relevant data. Other determinants of maritime piracy such as corruption, rule of law inefficiency, and political instability add to worries for a resurge after the pandemic even though the activity of Somali pirates has lately been contained following coordinated international naval efforts, improved local governance, and reinforced security measures aboard ships.

In this context, the purpose of this study is to go deeper into the underlying causes of maritime piracy focusing on two geographical areas, namely the Gulf of Guinea and the Gulf of Aden and touching upon institutional, legal and socioeconomic determinants of piracy, over the 2002-2020 period. The paper contributes to pertinent literature as it depicts and measures the impact of the under-researched so far pirates' focus on attacking ships with flags of countries with lenient legal framework against piracy.

Conducting panel analysis, we reach three main conclusions. First, we confirm that the indicators of youth unemployment and corruption are positively associated with the incidence of piracy. In Nigeria, institutional factors, notably corruption, are more important in boosting piracy than socioeconomic factors, such as youth unemployment. The reverse is true for Somalia. Second, our findings reveal that in both regions pirates have "preferred" flags, tending to attack ships with the flag of countries where they can expect less severe punishment if arrested. Thus, the legal framework in place stands out as an important determinant of piracy.

Several policy implications stem from this analysis, providing useful insights for the international maritime industry, as well as for national and international policy-makers. The major policy implication corroborates the consensus in the extant literature for international coordination in legislation against piracy. Elimination of differences in sentences for piracy crimes in different countries would eliminate "win-win" opportunities for prospective pirates. Finally, policies aiming to mitigate piracy need to consider the specific socio-economic context in each region. For example, the focus of policy needs to be on reducing youth unemployment in the case of Somalia, while in the case of Nigeria emphasis needs to be placed on reducing corruption. The inverted U-shaped relationship found between the Corruption Perception Index and piracy implies that reducing corruption gives a hefty reward in terms of containing and maintaining maritime privacy in both regions.

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