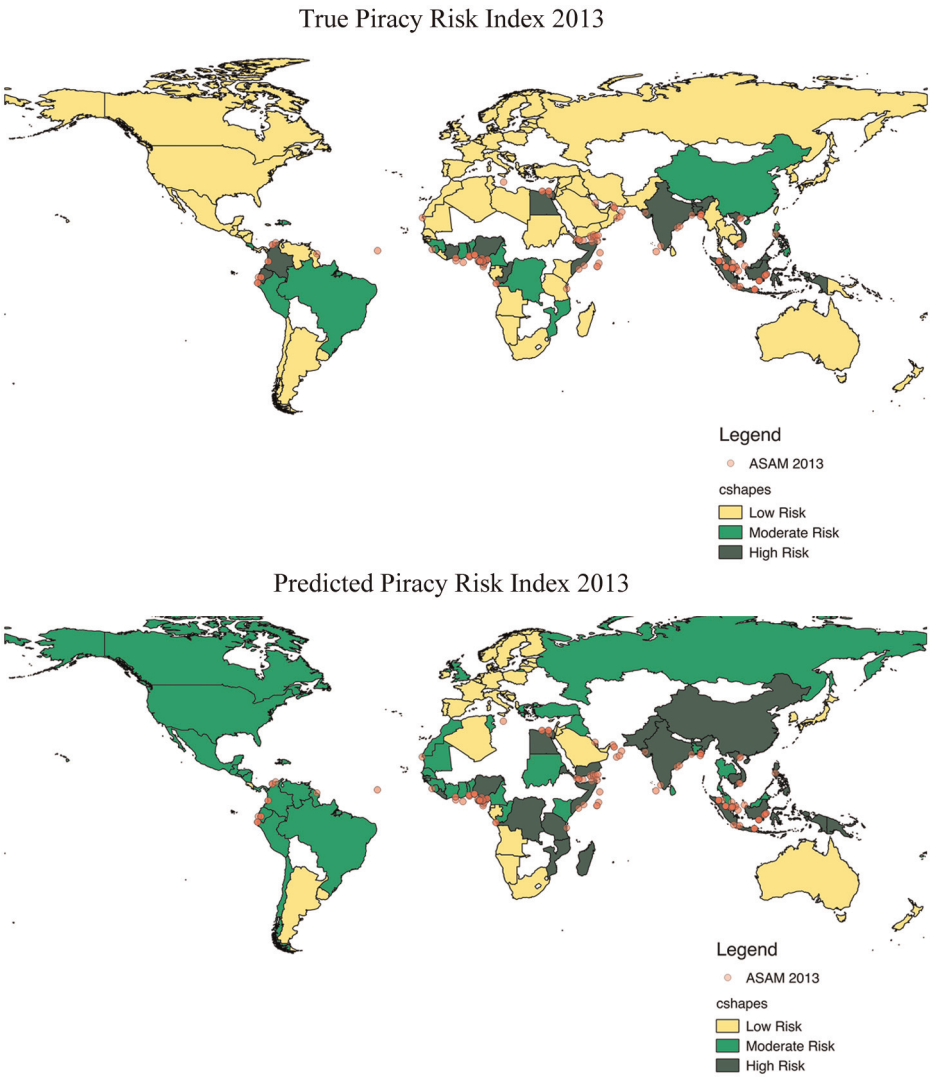

Figure 3. Map of true piracy risk index and forecast piracy risk index, 2013. Figure is reproduced in color in online version.

predictions. For example, for true high-risk countries (those that experienced more than four piracy incidents in 2013), our model correctly predicts six out of the 12 countries while randomness expects only two. We do under-predict six cases, but our under-prediction is only in one category (moderate risk rather than high risk). In fact, we do not predict any low-risk countries that actually were high risk, which increases confidence in our analytical model.

Figure 3 maps our predictions and compares those predictions with true piracy in 2013. The maps also plot the actual location of piracy incidents for 2013. The map on the left displays the true piracy risk index while the one on the right displays our model predictions. One can see that our model tends to err on the side of slight over-prediction of risk rather

Table 4. Prediction accuracy for true high-risk countries (four or more incidents) and true moderate-risk countries (one to three incidents), 2013

Model prediction low risk	Model prediction moderate risk	Model prediction high risk
True high-risk countries		
None	Colombia	**Nigeria**
	Peru	**Somalia**
	Ivory Coast	**Egypt**
	Togo	**India**
	Malaysia	**Vietnam**
	Bangladesh	**Indonesia**
True moderate-risk countries		
Gabon	**Dominican Republic**	Tanzania
	Guyana	Mozambique
	Ecuador	Philippines
	Brazil	
	Mauritania	
	Guinea	
	Sierra Leone	
	Ghana	
	Congo	
	Kenya	
	Morocco	

than under-prediction. Countries such as Russia, Canada, Turkey and the US receive a moderate-risk score, but actually experienced no piracy incidents in their waters in 2013.

Table 4 conveys similar information about the accuracy of our forecasts. The top half of the table shows true high-risk countries in 2013 and the precision of our model. We correctly forecast six high-risk countries, such as Nigeria, Somalia, Egypt, and India (the top-right cell in bold type). We under-predict six countries that actually experienced four or more piracy incidents in 2013 including Colombia, Peru, Ivory Coast, Malaysia, Bangladesh, and Togo. Our model does best with true moderate-risk countries, where we correctly forecast 11 of the 15 cases (middle cell in bold type), under-predict only one and over-predict three. The three over-predicted cases might be ones to closely monitor in the future. Our model suggests these are countries that should have more piracy than they currently do, and therefore our predictions could be a useful early warning signal of increasing risk for policy makers.

Conclusion

We have argued in this paper that Boulding's (1962) concept of the LSG can be successfully applied to maritime piracy. In particular, the LSG suggests that countries' ability to exert authority is affected not only by governments' extractive capabilities at the center but also by the cost of extending authority across space. Drawing on applications of LSG to international and intrastate conflict (Buhaug, 2010; Lemke, 2002), we pointed out that explanations of piracy highlighting states' institutional capacity neglect the importance of the decline of authority over distance. We therefore hypothesized that the territorial reach of states mediates the effect of institutional or economic conditions on piracy, and empirical analyses showed support for these conditional relationships. Operationalizing reach by measuring the average capital–coastline distance, we show that capacity has little effect when distances are

short (and LSG is small), but piracy increases substantially for states with long or very long distances. Our findings also show that these conditional relationships are not limited to specific operationalizations of independent and dependent variables. Finally, in response to recent research emphasizing the importance of examining predictive accuracy (Daxecker and Prins, 2015; Ward et al., 2010), we create an index categorizing countries as low, moderate or high risk from piracy, and show that our model correctly predicts more than 50% of cases in each of these categories, which is a substantially improvement over a naive prediction.

Our argument and findings have implications for future research and policy. First, they have implications for the relationship between capacity, distance, and piracy at the micro level. It would, for example, be interesting to examine whether pirate groups locate themselves in geographically distant and difficult to govern areas, which could provide micro-level evidence for our argument. An additional implication with regard to piracy location is that pirates in less capable states should locate closer to countries' power centers, since weak states struggle to extend authority across distance. Third, there are potentially countervailing tendencies for the effect of capacity and reach on piracy that remain unexplored. On the one hand, pirate groups should be attracted to ungoverned spaces because it is easier to organize and plan attacks. On the other hand, proximity to ports—generally centers of economic activity with higher state reach—is also important for pirates. For policy, while countries cannot easily change their geography, our findings suggest that the strategic positions that administrative and marine enforcement bodies take can counteract some of the implications of difficult geography.

Acknowledgments

We thank Jessica Di Salvatore and Samantha Okowita for excellent research assistance. We are grateful to Paul Hensel for comments on an earlier version.

Funding

Funding for this project provided by the US Department of Defense, Office of Naval Research, through the Minerva Initiative # N00014-14-1-0050. Data and Stata do files used in the empirical analyses can be found at: http://brandonprins.weebly.com/minervaresearch.html.

Notes

1. Chip Cummins, 2008, "Piracy grips Gulf of Aden", *Wall Street Journal*, 8 September, http://online.wsj.com/article/SB122083029536208391.html. Cummins reports that MISC-Berhad, which operates a very large number of tanker ships (especially ones that transport liquid natural gas), has ceased transports through the Gulf of Aden owing to piracy.
2. The total number of incidents globally has declined from nearly 450 incidents in 2010 to fewer than 250 in 2014 (data from the International Maritime Bureau).
3. Since decisions to relocate capital cities are rare, concerns over reverse causality should be considerably lower than those for common measures of state capacity. With regard to selection into treatment, capital cities are arguably strategically located based on ex ante assessments of threats to power projection (Campante et al., 2014). However, the direction of this selection bias is unclear. Most threatening for our inferences would be if states with higher capacity to project power chose locations close to coastlines to protect trade or other interests, since reduced piracy in states with short capital–coast distances would then simply reflect greater ex ante capacity. Yet the reverse claim seems more plausible; that is, weaker states should have more incentives to select

coastal capitals because capitals' proximity to coasts facilitates the protection of economic interests. This selection effect, however, would suggest that shorter capital–coast distances reflect lower ex ante power projection, which should make it more difficult to establish the hypothesized positive effect of distance on piracy.

4. In the post-Second World War period the US and Russia alone account for over 30% of the total armed conflicts witnessed globally.
5. Arguably state weakness helps drive transnational crime too. Transnational criminal organizations flock to conflict zones where corruption and disorder are widespread (see Riley and Kiernan, 2013).
6. Institutional capacity also implies a welfare role where societal wealth is redistributed to alleviate inequality and reduce grievance (MacCulloch, 2004; Taydas and Peksen, 2012; Thyne, 2006).
7. The concept of politically relevant dyads revolves explicitly around the ability to project power over distance.
8. This corresponds closely to Boulding's (1962) ideas of LSG. Boulding (1962: 78–79) writes, "the general principle applies that each party can be supposed to be at his maximum power at home (this may be an area rather than a point) but that his competitive power, in the sense of his ability to dominate another, declines the farther from home he operates." Boulding generally uses the term "home base" to refer to a country's power center and so does not explicitly refer to the capital city. However, the capital city seems a logical place to originate LSG.
9. Mason et al. (2011) find evidence that following civil wars government military strength deters former rebels from again challenging the regime, although admittedly rebel victory in the war produces a longer duration of peace than government victory.
10. The absence of the state does not necessarily mean the absence of governance. Informal arrangements can provide order and stability (Rabasa, et al., 2007; also see Mitchell, 2010). Generally for us, state capacity refers to the ability of a state to enforce its will and this requires both manpower, in the form of police and security forces, and revenue, to provide public goods.
11. The international community remains concerned about ungoverned and ungovernable spaces inasmuch as they offer places where terrorist organizations can both hide and train even if at times this narrative reinforces militarism that fuels grievance (Mitchell, 2010).
12. In addition to institutional weakness, research has shown the importance of economic considerations for piracy. Poverty or unemployment increases the individual demand for piracy, and lucrative rewards from the capture of valuable cargo ships provide pirate groups with resources necessary to attract new recruits (Daxecker and Prins, 2013; Jablonski and Oliver, 2013). While we think that the mediating effect of reach also applies to economic explanations, measures of economic opportunity such as GDP per capita have been used as measures of state capacity in research in insurgency (Fearon and Laitin, 2003: 274). We include robustness tests that examine the conditional relationship between economic opportunity, distance, and piracy, but do not focus on economic explanations because of the difficulty distinguishing this concept from measures of capacity.
13. New data on naval power should be of particular interest for piracy scholars (see Crisher and Souva, 2014).
14. If maritime piracy represents a source of funding for rebel groups, then attacks against ships (both steaming and stationary) may be less opportunistic than previously thought. Several clear examples of the insurgency–piracy connection have been noted, such as MEND in the Niger Delta and Abu Sayyaf in the Southern Philippines.
15. While our argument emphasizes the interaction of geographic distance and capacity, we also anticipate that distance increases piracy directly and find empirical support for this independent effect. Yet an emphasis on the mediating relationship is arguably most consistent with Boulding's LSG.
16. State capacity revolves around both coerciveness and legitimacy.

17. The fact that local governments may be indifferent to, or even complicit with, piracy is consistent with this expectation because such collusion is a result of state weakness and lack of power projection. Such institutional corruption also impacts criminal activity more generally (see Coggins, 2010). Indeed, crime prevention efforts have shown success both where policing has increased but also where trust in governing institutions has improved (Greene, 1990).
18. We follow the IMB's coding procedure in assigning incidents to states. Incidents in territorial waters are assigned to the countries in which they occurred, whereas incidents in international waters are assigned to countries as a function of geographic proximity and the origins of the pirates (email conversation with IMB, December 2012). Data are collected from annual IMB reports for the time period under analysis, http://www.icc-ccs.org/piracy-reporting-centre
19. The number of incidents ranges from 0 to 160 per country-year, but the data are right-skewed with a mean value of 2.37.
20. The number of hijackings ranges from 0 to 33 per country-year, but the data are again right-skewed with a mean value of 0.15.
21. While we considered using measures of military capability as an additional measure of capacity, we decided against it because heavy investment in the military could be a sign of state instability and also correlates with lower economic growth (Buhaug, 2010: 112). In addition, we do not include per capita GDP as an indicator of state capacity because it also serves as a measure of economic opportunity. Indeed, GDP per capita arguably correlates with the presence or absence of legal employment opportunities, which creates an alternative causal pathway to piracy (Daxecker and Prins, 2013; Jablonski and Oliver, 2013). For this reason, we only include a model with GDP per capita and its interaction with distance in robustness tests. However, we include per capita GDP as an indicator of the demand for piracy in each of primary models.
22. If we had systematic location information on pirate groups, then we could simply measure the average distance between capital and pirate group location. Unfortunately, other than for a few groups in a few countries (Somalia and Indonesia mostly), we do not know where pirate groups are located. Therefore, while our argument applies to the location of pirate groups, we measure the average distance between capital and coastline as a proxy for how far governments must project power over distance to affect pirates and piracy. The greater the distance, the more difficult it is to affect piracy, but this relationship also depends on state capacity.
23. Minimum and maximum distances were calculated as planar distances (i.e. as if the coastline was projected on a two-dimensional Cartesian coordinate system). Overseas territories (such as Guam for the US) were not included in these distance calculations.
24. Measuring only the maximum distance risks overestimating the effect of distance in states with long coastlines, but that also have capitals proximate to the coast. However, we present a robustness test that shows our results to be consistent when using a maximum distance measure.
25. As discussed, GDP per capita has also been used as an indicator of state capacity. We examined pairwise correlation coefficients between GDP per capita and measures of state capacity but found no problematic values. The variable is log-transformed (ln + 1) to reduce skewness in the data. Data are available at http://data.worldbank.org/.
26. The measure is log-transformed because of high skewness. Data are availabler = at http://www.wto.org/english/res_e/statis_e/statis_e.htm.
27. The CShapes dataset was used to create the inverted distance interdependence matrix (Weidmann et al., 2010).
28. A robustness test in Table 2 using feasible GLS for autocorrelation within and across panels and panel heteroskedasticity shows results consistent with the GEE estimator.
29. A robustness test (not presented) showed that results remained consistent with an AR2 specification.
30. We used the marginsplot routine in Stata 13 to create the interaction figures.
31. Pairwise correlation coefficients indicate a 0.63 correlation for distance and coastline length, and 0.75 for distance and land area, respectively.

32. Data on coastline length (in kilometers) come from CIA (2011).
33. Data on land area (in square kilometers) come from CIA (2011).
34. http://www.systemicpeace.org/inscr/inscr.htm
35. Insurance fraud, however, may contribute to over-reporting at times.
36. We ran each and every model in Tables 1 and 2 with the spatial lag of state capacity. The results remained consistent with those presented in models 1–6 and 8–13 and in most cases were a little stronger.

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